NETWORK WORLD

The Newsweekly of Enterprise Network Strategies

Volume 9, Number 20 | An International Data Group Publication | May 18, 1992

IBM leads rush to new FDDI spec

By Caryn Gillooly
Senior Editor

WASHINGTON, D.C. — Eleven companies, including IBM, last week announced support for yet another proposed FDDI-over-shielded twisted-pair standard, and IBM is expected this week to bring out products conforming to the specification.

With vendors such as Chipcom Corp., Madge Networks, Inc., Motorola, Inc. and SynOptics Communications, Inc. joining IBM in the effort, analysts predict the new spec may fast become the de facto standard for transmitting data at 100M bit/sec over shielded twisted pair.

But there are two major problems with the new specification for Fiber Distributed Data Interface over shielded twisted pair, dubbed SDDI. First, although SDDI was proposed to the ANSI X.3T9 committee last October, the proposal was rejected.

Second, products conforming to the SDDI specifications will not interoperate with existing products built to earlier specifications.

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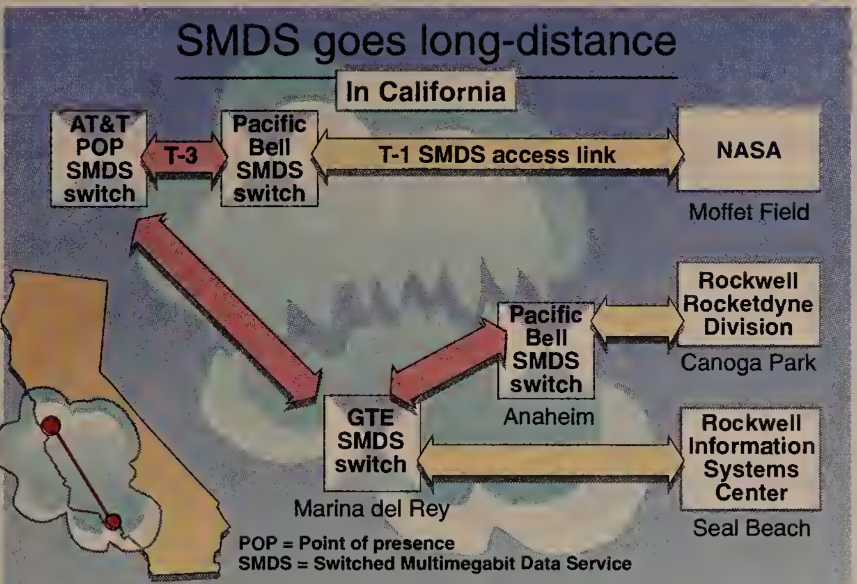

Rockwell International Corp. and NASA are participating with AT&T, GTE and Pacific Bell in the first long-distance SMDS trial. AT&T says the 4-month trial is a first step in determining how to provision the service.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: GTE CORP., IRVING, TEXAS

Users, carriers team for long-distance SMDS trial

By Anita Taff
Washington Bureau Chief

Rockwell International Corp. and NASA last week teamed up with AT&T, GTE Corp. and Pacific Bell to kick off the first trial of Switched Multimegabit Data Service (SMDS) involving both local and long-distance carriers.

In the four-month trial, Rockwell International sites in the Los Angeles area and a National Aeronautics and Space Administration location in San Francisco will test local-area network and supercomputer interconnection over the SMDS link.

AT&T's participation marks the first time a long-distance carrier has participated with local carriers in an SMDS trial. So far, none of the interexchange carriers has committed to rolling out the service, but an AT&T official said the trial is a first step in determining how to offer SMDS.

Jayne Fitzgerald, an AT&T product-line manager for high-speed data communications ser-

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Apple set to take Mac down OSI path

Will unveil at INTEROP new X.400 engine, full OSI stack and Office Document Architecture packs.

By Margie Wylie
Senior Editor

WASHINGTON, D.C. — After three years of promises, Apple Computer, Inc. will finally begin delivering Open Systems Interconnection products for the Macintosh at INTEROP 92 Spring here this week.

The company is expected to announce an X.400 electronic mail engine — a Message Transfer Agent (MTA) in X.400 parlance — as well as an OSI protocol stack for the Macintosh and software that lets applications create Office Document Architecture (ODA)-compliant output, according to sources.

Apple is also expected to unveil a modified version of its Transmission Control Protocol/Internet Protocol stack for the Macintosh that works with token-ring cards.

The Macintosh-based X.400 MTA, due this summer, will provide the basis third parties need to create E-mail packages and gateways based on the international OSI E-mail standard.

The MTAs, the most fundamental component of X.400 systems, perform the majority of the

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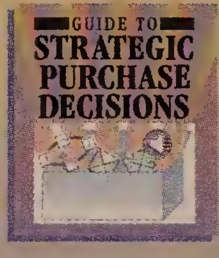

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- First NW/Bell Labs frame relay test on routers
- Examination of interexchange carrier billing options

SunConnect preps SunNet Manager 2.0

By Bob Brown
Senior Editor

WASHINGTON, D.C. — Sun Microsystems, Inc.'s SunConnect business unit this week will unveil a more powerful version of its SunNet Manager and name 35 new development and distribution partners for the open network management system.

SunNet Manager 2.0, which will be unveiled at the INTEROP 92 Spring trade show here, offers a variety of features designed to ease management of larger networks. The new version can support more network nodes and automate a variety of functions.

The debut comes hot on the heels of rival Hewlett-Packard Co.'s introduction of new OpenView version.

SunConnect executives also discussed future directions for

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NETLINE

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17 VENDORS PLAN to announce support for the new Software Licensing API. Page 4.

AT&T OFFERS NEW management and maintenance features for its InterSpan frame relay service. Page 4.

CHIPCOM ADDS FDDI hub modules and management features to its ONline LAN hub. Page 6.

SYSTEMS CENTER, TANDEM to deliver first fruits of joint development efforts for managementwares. Page 6.

IBM TO ENHANCE NetView GUI, announce delivery dates for latest release. Page 6.

GE AEROSPACE outsources telecommunications equipment operations to WilTel Communications. Page 6.

NEWSPAPER

NEWS FEATURE

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SNMP security promises to give users more control

By Kelly Jackson Higgins
Special to Network World

It's no secret to users that the popular Simple Network Management Protocol can't be completely trusted.

Known security holes in the protocol have discouraged many network managers from using SNMP to actually control their network devices. Instead, most use SNMP only for monitoring equipment.

But all that is about to change. A set of SNMP security specifications is expected to become a proposed standard in the Internet community this summer. Acceptance of the specifications will pave the way for a new generation of secure SNMP-based products that will give users confidence in employing SNMP to change device configurations and repair equipment problems.

SNMP experts say the availability of SNMP security will be the force driving vendors to enhance SNMP products by implementing the SET command, which can be used to establish performance parameters on network devices. Many of these vendors have maintained that SNMP's inherent security flaws

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AT&T matches Sprint toll fraud protection services

NetProtect will cover 800 and international calls, offer users higher levels of protection for a fee.

By Anita Taff
Washington Bureau Chief

NEW YORK — Following Sprint Corp.'s cue, AT&T last week rolled out a family of toll fraud services and associated products designed to help users detect fraud.

The product family, called NetProtect, includes network monitoring services, consulting and educational services as well as a new software package for AT&T's Definity line of private branch exchanges.

The announcement follows on the heels of an offering Sprint unveiled last month dubbed Sprint-Guard. Unlike that service, which only monitors international calls, AT&T's offering will monitor 800 and international calls.

AT&T matches Sprint's offer to cap user liability for fraud at $25,000 per incident but offers optional coverage that fully relieves customers of liability if they curtail fraud within two hours after notification. Sprint's offering sets user liability at $25,000 per year per switch.

Both carrier programs are intended to help companies prevent hackers from dialing into their private branch exchanges or

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UPS constructs nationwide multicarrier cellular net

Network to help delivery company track packages.

By Maureen Molloy
Senior Writer

MAHWAH, N.J. — United Parcel Service, Inc. (UPS) said last week it will spend $150 million over the next year to construct a nationwide digital cellular network that will enable it to reliably track packages.

The project, which marks the first time multiple carriers have teamed up to provide a nationwide cellular network for a customer, is expected to enhance the package delivery company's customer service by enabling it to immediately pinpoint the location of any parcel.

GTE Mobile Communications, McCaw Cellular Communications, Inc., PacTel Cellular and Southwestern Bell Mobile Systems are building the cellular net, which will provide blanket coverage of every zip code area in the continental U.S.

Widest scope

UPS said it chose the cellular net over existing radio networks, such as ARDISNET or RAM Mobile Data, because the combined cellular carriers provide the widest geographic coverage along with high network reliability and the

(continued on page 8)

3Com software aids hub, bridge/router net mgmt.

By Skip MacAskill
Staff Writer

SANTA CLARA, Calif. — 3Com Corp. is expected to unveil this week at INTEROP 92 Spring a suite of applications for SunConnect's SunNet Manager that are designed to manage 3Com's internetworking products.

The ViewBuilder/Unix line of graphical network control tools includes applications for managing 3Com's NetBuilder bridge/routers and LinkBuilder 3GH hubs, as well as an enhanced version of an existing package that enables net administrators to remotely boot up devices and download software.

The products run on the Unix-based SunNet Manager, but migration to other open platforms is expected in the future. "We targeted SunNet Manager first because it has the leading market share," said Raj Dhingra, 3Com's product manager for network management products. "We are monitoring the market and will respond to customers that want Hewlett-Packard Co.'s OpenView or IBM's NetView/6000."

The announcement marks a dramatic shift from 3Com's earlier strategy of relying on a propri-

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Briefs

Sprint to unveil new gear at ICA. Sprint International this week will announce at the International Communications Association trade show in Atlanta a new dedicated frame relay switch that the company will deploy in its public frame relay network and market to other carriers.

Separately, Sprint Data Group this week will demonstrate a prototype of a new customer premises device it designed with Teleos Communications, Inc. The device, which features inverse multiplexing capabilities, lets users dial up bandwidth on demand over a Primary Rate Interface link to access Sprint services supporting videoconferencing, LAN-to-LAN interconnection and other applications.

Kentrox to demo SMDS DSU. ADC Kentrox said it will demonstrate at INTEROP 92 Spring this week a Switched Multimegabit Data Service (SMDS) data service unit operating at DS3 rates. The DataSmart 45 SMDSU is four to 10 times faster than competitive products providing access to SMDS networks, the company claims. The product will be available this year. Pricing was not disclosed.

Microsoft offers host E-mail gateways. Microsoft Corp. announced last week it is now shipping Microsoft Mail Host Access Version 3.2 for IBM's Professional Office System (PROFS) and OfficeVision. The product, an upgrade to the company's local-area network-based Microsoft Mail PROFS gateway, offers enhanced performance, error detection and recovery as well as better integration with Microsoft Mail's directory system. The company is also shipping Microsoft Mail Distribution Manager Version 3.2 for IBM PROFS and OfficeVision, VM-based software that lets Microsoft Mail users access many host-based electronic mail systems using the ZIP protocol. Microsoft Mail Host Access costs $14,995 per VM host computer. The price of Microsoft Mail Distribution Manager depends on the configuration.

Sybase wins contract. Sybase, Inc. last week announced a $1 million contract with brokerage house Smith Barney, Harris Upham & Company, Inc. for 150 copies of Sybase SQL Server and client/server application development tools. The brokerage firm initially plans to use Sybase to build a variety of client/server applications for account management, sales and inventory management. In the future, Smith Barney will use Sybase's on-line relational database management system for order entry and establishing new customer accounts, both of which will reduce complicated paperwork.

ARDIS, SSI enter joint marketing deal. ARDIS Co., which operates the ARDISNET nationwide wireless data net, and Service Systems International, Inc. (SSI), a software developer, last week announced that they will jointly market a service that will allow companies to implement wireless data technology in their field operations. The service, dubbed S2000 TechNet, includes use of a hand-held device or portable computer, SSI's TechNet remote communications software and access to ARDISNET for a flat monthly fee.

Pitney Bowes chooses MCI. Pitney Bowes, Inc. last week awarded MCI Communications Corp. a three-year, $15 million contract to build a Virtual Network (Vnet) linking roughly 200 sites to the office systems vendor's corporate headquarters in Rye Brook, N.Y. In addition, Pitney Bowes will use MCI's 800, Vnet Calling Cards and MCI Network Management Services.

CONTACTS

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Vendors agree on way to manage program usage

By Jim Duffy
Senior Editor

REDWOOD CITY, Calif. — At least 17 vendors this week are slated to announce support for an application program interface (API) that will enable their products to work with a variety of network-based tools to track application usage.

The vendors, including IBM, Digital Equipment Corp., Microsoft Corp. and Novell, Inc., will back the Software Licensing API, which will debut at a Software Publishers Association meeting here. The Software Licensing API will eliminate the need for software vendors to tailor their applications to work with different licensing servers and for users to buy programs compatible with a single licensing system.

The API is intended to allow users to invoke, from any application on their personal computer, requests for software licenses regardless of which licensing server is used.

For example, when a user launches an application from the PC, the program uses its coded licensing calls to transparently request a license from a network server.

A license management server, such as NetLS from Hewlett-Packard Co. and Gradient Technologies, Inc., locates the server responsible for the application and sends authorization or denial for its use back to the user.

After the user is finished with the application, the license is returned to the application server.

Other companies planning to announce support for the API include Banyan Systems, Inc., Borland International, Inc., Brightwork Development, Inc., Funk Software, Gradient, Highland Software, HP, Lotus Development Corp., Micrografx, Inc., the Open Software Foundation, Inc., Symantec Corp., Tangram Systems Corp. and WordPerfect Corp.

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AT&T offers frame relay net mgmt.

By Bob Wallace
Senior Editor

BASKING RIDGE, N.J. — AT&T last week announced a service option for its InterSpan frame relay offering under which it will manage and maintain end-to-end frame relay links for customers.

With the Extended Connectivity Option, customers can minimize or obviate the need to manage their own frame relay network by letting the carrier manage it from a dedicated frame relay service center.

To make its frame relay service even more attractive, AT&T is following the lead of most major service providers that offer customers the option of buying or leasing on-site frame relay equipment such as routers.

"The purpose of the Extended Connectivity Option is to make our frame relay service easier to use, manage and adopt," said Jayne Fitzgerald, a product-line manager of high-speed data communications services for AT&T. "One way to do this is to offer a completely managed [service]."

With the Extended Connectivity Option, technicians at AT&T's frame relay network operations center in Southfield, N.J., monitor the service 24 hours a day, seven days a week.

"Although some companies prefer to manage the network themselves, we've found through the controlled introduction of [InterSpan] that quite a few want us to manage the network," Fitzgerald said.

Frank Field, a service division manager for the Extended Connectvity Option at AT&T Bell Laboratories, said AT&T will offer the service using an internally developed Simple Network Management Protocol-based net management system.

The SNMP system can be used with Transmission Control Proto-

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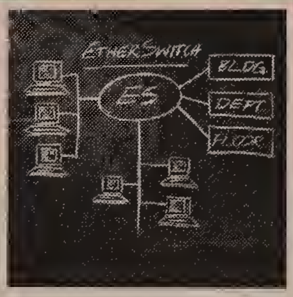

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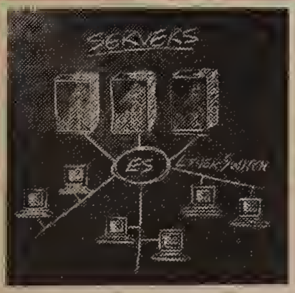

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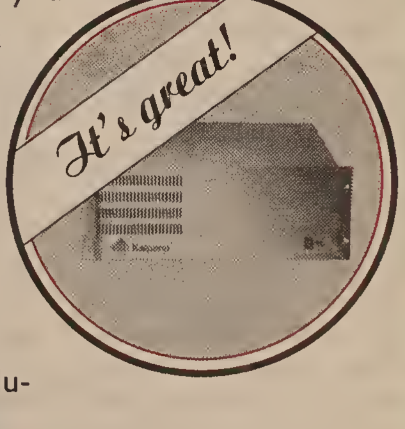

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GE Aerospace outsources CPE operations to WilTel

Hands over control of all its telecom equipment.

By Bob Wallace
Senior Editor

VALLEY FORGE, Pa. — GE Aerospace is expected to announce this week a seven-year outsourcing deal under which WilTel Communications Systems, Inc. will take over control of the company's entire telecommunications equipment operations.

Under the agreement, the WilTel unit will purchase the aerospace company's existing telecommunications assets, including switches, voice mail systems and Centrex station equipment, according to John McIntosh, vice-president of WilTel Communications' network services group.

WilTel Communications, a switch distributor, will handle equipment service, support, maintenance and management at 13 GE Aerospace locations in Florida, Massachusetts, New Jersey, New York, Pennsylvania and Vermont.

"We think that by going with WilTel [Communications], we can reduce telecommunications costs while enhancing the quality of our telecom operations," said a GE Aerospace spokesman. "This will allow us to focus our attention on things we can do in a world-class [way]."

GE Aerospace said it could not guarantee jobs for its 30-person telecommunications staff and has encouraged those employees to seek jobs with WilTel Communications.

> GE Aerospace said it could not guarantee jobs for its 30-person telecom staff.
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Although financial terms of the agreement were not disclosed, a WilTel Communications spokesman said the agreement represents the largest service and support contract the firm has won.

As part of the arrangement, WilTel Communications will construct a dedicated, centralized service center in GE Aerospace's headquarters here from where it will handle the company's telecommunications equipment operations, McIntosh said. "It'll be the nerve center of the company's telecom operations."

In addition, the WilTel unit will provide operator and directory services and hopes to eventually win some of GE Aerospace's network services business, he said. The company currently uses long-distance services from AT&T, MCI Communications Corp. and Sprint Corp.

WilTel Communications will perform station moves, adds and changes, and service and support for GE Aerospace's private branch exchanges as well as for sites that use Centrex, according to McIntosh.

Part of the challenge facing WilTel Communications is coming up with a common maintenance procedure manual. "This presents an enormous challenge because GE Aerospace is a distributed corporation and the switch vendor varies from location to location," he said.

Chipcom bolsters ONline hub with FDDI support

By Skip MacAskill
Staff Writer

SOUTHBOROUGH, Mass. — Chipcom Corp. last week extended the capabilities of its ONline local-area net hub with the announcement of its first Fiber Distributed Data Interface module.

The ONline FDDI Fiber Module will be demonstrated at INTEROP 92 Spring this week, where the company will also unveil FDDI management products currently in beta test. Chipcom also revealed that it is working on an FDDI-over-shielded twisted-pair module (see "IBM leads rush to new FDDI spec," page 1).

The new module, which requires two slots in the ONline System Concentrator, has eight ports and can support single-attached devices at distances up to 2 km. The 16-slot ONline hub can be configured with up to eight of the modules, providing a maximum of 64 FDDI connections. The FDDI module can also be used with the six-slot ONline hub.

The larger hub can be configured to support four independent FDDI networks, a feature that is unique to the ONline family, according to the company. "The advantage of this capability is that you can run four independent groups from the ONline hub," said Jamie Warter, Chipcom's FDDI product manager.

Segmenting the hub's backplane into four independent 100M bit/sec pipes reduces traffic loads on each LAN and increases net efficiency. Since the company does not offer an FDDI-to-FDDI bridge module, external bridges are required to link the separate FDDI nets.

The FDDI modules are the third and final component of Chipcom's TriChannel Architecture, which enables the firm's hubs to support a mix of FDDI, Ethernet and token-ring LANs.

The ONline hub can be configured to support three Ethernets, seven token rings or four FDDI rings. It can also handle a maximum configuration of all three, with one Ethernet, one FDDI and three token-ring networks.

The ONline hub's slot independence feature eases hub configuration by letting users plug in any module in any chassis slot. Modules can be logically linked to any backplane LAN segment from a central console without entering the wiring closet. The modules are also hot-swappable, which enables users to install or remove them without powering down the concentrator or the net.

Charlie Robbins, director of communications research at Aberdeen Group, Inc., a Boston consultancy, says the configuration feature is significant. "What's unique is that the user can flexibly assign these modules to any slot within the hub," he said. "Chipcom's approach is important because many times the net manager can't remember what was set up before. Chipcom takes the guessing out of the configuring."

To reduce connection costs, the new FDDI module supports Standard Termination connectors, which are used with fiber-based Ethernet and token-ring nets. This enables users to migrate existing fiber-based LANs to FDDI without having to reterminate each cable with the more expensive FDDI-specific Media Interface Connectors, saving $100 to $150 per port, according to Chipcom.

The ONline FDDI module is managed by the company's SunConnect SunNet Manager-based ONdemand Network Control System, an interactive, graphics-based software program that provides visual point-and-click control of all Chipcom devices.

The product is priced at $13,500, or $1,700 per port, and will be available in 45 days.

Net/Master for Tandem set to debut

By Michael Cooney
Senior Editor

RESTON, Va. — Systems Center, Inc. and Tandem Computers, Inc. will unveil today the first fruits of their 2-year-old partnership with the introduction of software that will let network operators centrally manage mixed Tandem and IBM networks.

Systems Center will announce NonStop Net/Master, a version of its Net/Master management software that will run on Tandem's NonStop fault-tolerant computers.

In addition to managing Tandem nets, NonStop Net/Master can be used to manage Systems Network Architecture nets and non-SNA nets, providing users with a highly reliable hardware platform for SNA network management.

The firm will also unveil SOLVE:Connect, gateway software residing on the Tandem computer that allows NonStop Net/Master to communicate net management information to Net/Master or IBM's NetView. The pack lets either of the host-based management systems monitor and control a Tandem-based net.

SOLVE:Connect implements a direct NetView interface for the NonStop Net/Master system. Previously, Tandem nets fed management information to NetView through a limited function service point interface such as NetView/PC.

With SOLVE:Connect, users can route net management messages, commands and responses to NonStop Net/Master, Net/Master or NetView. The product also lets users employ existing SNA management applications and automation tools to manage Tandem nets.

For example, using Net/Mas-

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IBM to announce NetView upgrades, availability date

Also releases enhanced AIX NetView/6000 GUI.

By Michael Cooney
Senior Editor

NEW YORK — IBM is expected this week to announce enhancements to its object-oriented NetView Version 2 Release 3 as well as the availability date for the product.

The company last week aired upgrades to the AIX NetView/6000, its RISC System/6000-based management system, and said the list of companies building applications for the platform has expanded to include SynOptics Communications, Inc. and Chipcom Corp., among others.

Analysts expect IBM to announce enhancements to NetView's Graphics Monitor Facility that will make it easier for users to display information about non-Systems Network Architecture devices in their networks.

IBM is also expected to provide clearer specifications for writing applications that work with NetView's Resource Object Data Manager (RODM).

RODM is a centralized object database that can maintain data on the systems and devices being managed by NetView or other SystemView applications.

"This next NetView release is important because it will more clearly define how RODM is going to open up and support third-party players," said Donald Czubek, president of GEN2 Ventures, a consultancy in Saratoga, Calif. "Without those definitions, it will only be useful for IBM SNA systems, and that's not the direction IBM is taking."

Analysts also expect IBM to announce that the new NetView will be available in December.

"It is out of Alpha testing and in field tests," said Walter Dymek, an analyst with Datapro Information Services Group in Delran, N.J.

The enhancements for host-based NetView follow on the heels of improvements to the AIX NetView/6000.

AIX NetView/6000, announced in January, runs under AIX on an RS/6000 and manages Transmission Control Protocol/Internet Protocol nets using the Simple Network Management Protocol.

New graphical console features allow users to zoom in to monitor specific net components or get additional information about a problem.

In addition, five new companies have joined the ranks of vendors building applications to run atop the AIX NetView/6000.

Among those are SynOptics, which will port its LattisNet software to the RS/6000 platform, and Chipcom, which will run its On Demand network configuration tool on the platform.

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DEC draws plans to enter the wireless E-mail market

By Jim Duffy
Senior Editor

ATLANTA — Digital Equipment Corp. this week will disclose agreements with RAM Mobile Data and BellSouth Enterprises, Inc. to offer users electronic mail services over a wireless network.

DEC is expected to divulge plans to develop E-mail software for portable computers that will let users exchange messages over a wireless, radio-based packet network. The firm is also expected to disclose plans to market a wireless modem made by Ericsson GE Mobile Data, Inc., a subsidiary of Swedish telecommunications giant LM Ericsson A/S.

The modem and DEC's E-mail software, which will be used on palmtop and notebook computers manufactured by DEC, are intended for use on the Mobitex network. Mobitex, developed by LM Ericsson, is operated in the U.S. under a joint venture between RAM Mobile Data and BellSouth Enterprises.

The announcements will be made at the International Communications Association's show here. BellSouth Enterprises and Ericsson GE declined to comment on specifics of the announcement. Details were not available from DEC and RAM Mobile Data by press time.

DEC and LM Ericsson already have a 7-month-old cooperative marketing and development arrangement to sell Mobitex products and services to vertical industries.

INTERNATIONAL
COMMUNICATIONS
ASSOCIATION

This week's announcement, however, will mark the first time DEC has focused specifically on wireless E-mail for all industries.

"Wireless E-mail is the killer application that's going to drive [wireless networking]," said analyst Peter Bernstein of Probe Research, Inc. in Cedar Knolls, N.J. "It's the glue that ties all the portable computing platforms" together and to other sites.

Wireless data network technologies are used by field technicians, sales representatives and traveling executives to log on to host computers at company headquarters to check the status of product inventory, for example. Analysts expect E-mail to make wireless networking more appealing to a wider range of industries.

DEC's endorsement of radio-based packet networks will pit the company against IBM in the wireless world. IBM is focusing on cellular wireless transmissions, and its packet-based technology was recently endorsed by nine major cellular carriers ("Cellular nets to use IBM plan for data," *NW,* April 27).

"There will be intense competition [for DEC] from packet cellular" as a result of the IBM endorsed-technology, said analyst Paul Callahan of Forrester Research, Inc. in Cambridge, Mass. "It's going to be a very hot 18 months for wireless."

IBM launches defense of its SystemView strategy

Plays spin doctor as users wait for product rollout.

By Michael Cooney
Senior Editor

NEW YORK — IBM last week launched a campaign to counterattack the rising notion that SystemView is the industry's best example of an architecture that defines nothing but vaporware.

Known as a "plan for a plan" in some user shops, the SystemView strategy has been long on talk and short on actual products. Users and analysts have also complained that the SystemView products that are available are too mainframe-centric.

> "We are glad to see IBM doing this because people don't buy architectures, they buy products."
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At a briefing in New York, IBM said it intends to change all that with a rollout of SystemView products later this year that will flesh out the architecture.

Bill Warner, IBM Network Systems' director of enterprise management, said the company is trying to ensure SystemView loses its mainframe-centric label.

"We will provide management options for all our platforms, and we will start by delivering our first SystemView platform on the OS/2 platform," he said.

While the briefing provided few new product details, IBM executives told *Network World* last month that it will roll out an open local-area network management software platform that will fall under the SystemView umbrella. The platform will let administrators run applications to centrally control IBM and non-IBM systems and nets ("IBM prepping open LAN mgmt. platform," *NW,* April 13).

The platform will be based on OS/2 and will include management software and a standard graphical user interface. One of its major goals will be to get third-party vendors to write management applications on top of it.

A similar platform for the Application System/400 will also appear under the AS/400 Systems Management title, according to IBM.

"We are glad to see IBM doing this because people don't buy architectures, they buy products," said Bill Bailey, director of network planning and development for Unum, a life insurance company based in Portland, Maine. "There aren't that many out there for us to use."

Other users and analysts cast a hopeful but doubtful eye at the new SystemView LAN strategy.

"With SystemView, the LAN has always seemed to take a less important role than everything else — even though LANs are really the troublemakers of network management," said Dick Boyle, program director for local-area communications for Gartner Group, Inc. in Stamford, Conn. "IBM has to step up and make this new LAN management platform [an industry leader], otherwise users will move onto something else."

But some users already have moved on. Unum, for example, has written a lot of its own code to perform the LAN software distribution, performance and tuning functions that are lacking in the current SystemView product line.

"We are optimistic about what SystemView promises but are afraid it will come too late for us to use," said Paul Dolbec, director of distributed technology support services at Unum. "IBM has its heart in the right place, but it is

(continued on page 87)

UPS constructs multicarrier net

continued from page 2

easiest migration path to future mobile data technologies.

"The four carriers will give us substantially more coverage than we could get with ARDIS or RAM systems," said Gene Hughes, vice-president of UPS strategic technology planning.

This is important because the wider the coverage, the less the company will have to rely on standard local access facilities, he said.

Hughes said the use of cellular facilities is also less expensive than radio net services because no infrastructure investments, such as switching equipment, are required.

Instant package tracking

The cellular net, which should be completed by early next year, will be linked to UPSnet, the company's nationwide private packet-switched network. UPS delivery trucks will access the net using Motorola, Inc. cellular transmission equipment.

When customers receive a package, they sign their name on an electronic pad called the Delivery Information Acquisition Device (DIAD). The DIAD is a microprocessor-based unit with a keypad, infrared bar code scanner and small LCD screen. Customer signatures are displayed on the LCD and stored in memory.

The driver then places the DIAD into a Vehicle Adapter in the truck that — combined with a cellular telephone modem — transmits the information over the cellular network to UPSnet. From there, the information is sent to a host mainframe at UPS' information services headquarters here.

Once completed, the network will provide immediate access to delivery information, such as package tracking and receipt verification, for more than one million daily UPS customers.

Today, drivers return to their distribution centers at the end of the day and upload the information stored on the DIAD to UPSnet. Subsequently, customers must wait at least a day before learning the location and status of a parcel.

Vendor cooperation

Paul Heller, UPS' systems manager for mobile networks, said the four carriers will work together to provide UPS with a unified billing and network management system, including a 24-hour help desk.

> "What we needed was to have the carriers work together to establish what looks like a unified network," Heller said.
>
> ▲▲▲

"Originally, we saw no way to build a national service using cellular technology," Heller said. "What we needed was to have the carriers work together to establish what looks like a unified network."

According to Dale Hatfield, a telecommunications consultant in Boulder, Colo., the size and geographic scope of UPS' network has provided the necessary impetus for the cellular industry to move more aggressively into the wireless data market.

"It took the initiative of a major national customer to spur the companies to form the alliance," Hatfield said. "The UPS announcement is a major milestone in the development of the cellular industry."

Vendors agree to manage usage

continued from page 4

The API will enable client applications to invoke a set of function calls that include request, in which a client asks for a copy of a licensed application; release, in which a client returns the license; and update, which verifies that a user still has the license.

At least 13 of the companies were involved in the API's definition ("Vendors ally on software distribution," *NW,* Jan. 13). It was originally expected in March, but indecision among the companies on whether to include server-specific features in the API held up its release, according to a source.

These features would allow an application to invoke sophisticated functions, such as logging software use by CPU cycles or time, that are specific to a vendor's licensing server. Such extensions would have rendered applications server-dependent, the source said, so the group ultimately decided against incorporating them.

The API is quite vendor-neutral, according to Len Halio, president and chief executive officer of Gradient. "There won't be anything that causes one vendor to have an advantage over another."

Until now, waiting for network printing has required the same amount of patience.

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Security promises more control

continued from page 1

made using the SET command impractical.

SNMP security represents the industry's first open and secure management technology, according to industry experts. The International Standards Organization, for example, is developing an architecture that adds security across all seven layers of its Open Systems Interconnection model, rather than one used only with its Common Management Information Protocol.

"If your network management isn't secure, neither is your network," said Jeff Case, a codeveloper of the SNMP protocol and president of SNMP Research, Inc. in Knoxville, Tenn.

The approval process

The SNMP security specifications today are in the form of three Internet draft documents: the security framework, the security protocol and the Management Information Base.

In March, the Internet Activities Board (IAB), which governs the Transmission Control Protocol/Internet Protocol and stamps standards, bounced the drafts back to their authors for some minor text edits.

Steve Kent, a top security expert at the IAB, expects the drafts will be accepted as proposed standards once the edits are complete. From there, SNMP vendors can begin incorporating the technology into their products, which means secure SNMP products for users.

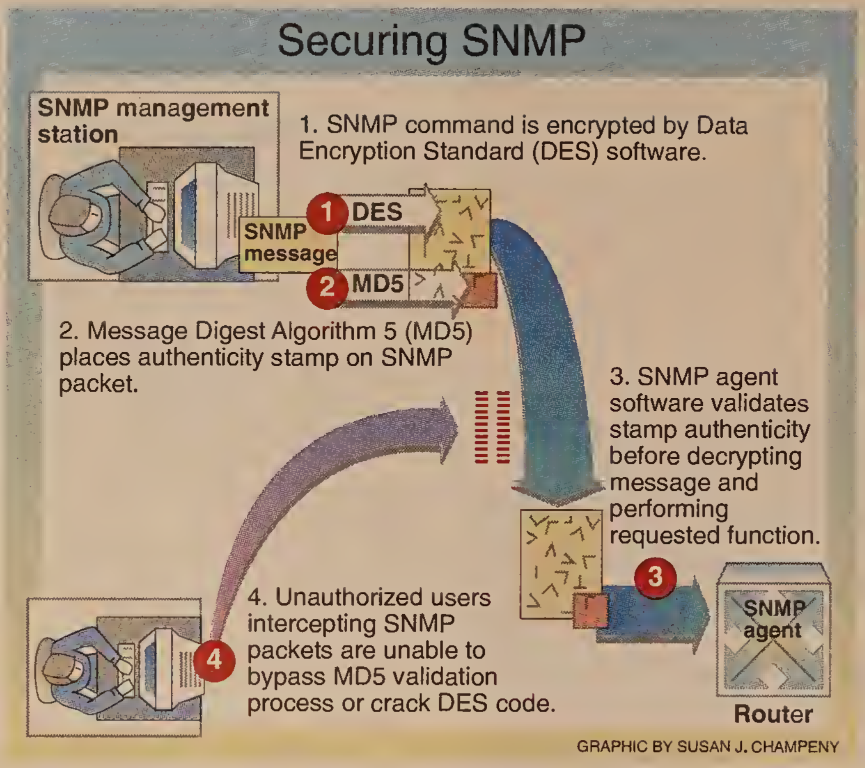
"We have been lucky that network intruders so far have passed over attacking the [Internet] network switching infrastructure, which is terribly vulnerable," Kent said. "Most have gone after end-user data, workstations and computers."

The proposed SNMP security specifications will remedy SNMP's main flaw: its so-called "community string/names" feature. Today, when an SNMP-managed node sends an alert to an SNMP-based management station, it broadcasts its community name — the equivalent of a password — across the network. The community name can be intercepted by an unauthorized user, who can then masquerade as a manager.

In many cases, someone could steal an SNMP community name by attaching a protocol analyzer or similar device to the local-area network, turn on the packet capture function and decode the SNMP packets. However, many SNMP implementations have proprietary safeguards that make it a bit more difficult to intercept an SNMP community name.

"This has held us back from using all of the features of SNMP," said Jeff Christmann, LAN manager for Electronic Data Systems Corp.'s (EDS) technical services organization.

Like many SNMP users, EDS configures some of its network devices using the TCP/IP Telnet protocol, rather than SNMP. Telnet, the terminal-emulation feature in TCP/IP, is commonly used to log onto a network device and emulate that device's management terminal.


Securing SNMP
SNMP management station
1. SNMP command is encrypted by Data Encryption Standard (DES) software.
1
DES
SNMP message
2
MD5
2. Message Digest Algorithm 5 (MD5) places authenticity stamp on SNMP packet.
3. SNMP agent software validates stamp authenticity before decrypting message and performing requested function.
3
SNMP agent
Router
4
4. Unauthorized users intercepting SNMP packets are unable to bypass MD5 validation process or crack DES code.

GRAPHIC BY SUSAN J. CHAMPENEY

Milo Medin, deputy project manager for the National Aeronautics and Space Administration's Science Internet office at NASA Ames Research Center in Moffett Field, Calif., said he uses Telnet rather than SNMP to configure a router because Telnet is safer.

But EDS, NASA and other SNMP users are eagerly awaiting the arrival of the new SNMP security technology, which will guard against unauthorized tampering, access and eavesdropping in the network.

SNMP security is made up of two basic components: an algorithm called the Message Digest Algorithm 5 (MD5) for authentication and the Department of Defense's Data Encryption Standard (DES) for privacy.

MD5 prevents users from modifying SNMP management information traveling across the network. For example, it prevents an unsavory user from changing an "Enable X interface" command to "Disable X interface."

With MD5, no user can falsely pose as a network manager and take over the network, Case said. It also ensures that network messages, such as commands to shut down a system at a certain time, can not be tampered with, he said.

DES-based privacy ensures that only authorized users can monitor the goings-on in a network.

Although most network managers admit they do not mind if a user learns how many packets a particular router has handled, they worry about some data, such as encryption keys, falling into the wrong hands.

Case said DES will most likely be used when managers download sensitive data, such as new encryption keys, from the SNMP manager to its managed nodes.

SNMP security is the Internet's second security technology. The Internet, which has weathered numerous security breaches such as the infamous worm incident in 1988, also offers Privacy Enhanced Mail, an electronic mail encryption service.

Kent and other Internet officials are building an Internet security architecture that will call for the use of SNMP security and Privacy Enhanced Mail to protect the massive research and development network. "SNMP security is consistent with our model of Internet security," he said.

However, the Internet is not the only network that will get SNMP security. Bell Communications Research, in Livingston, N.J., the R&D arm of the Bell operating companies, has proposed SNMP security in its recommended architecture for Switched Multimegabit Data Service (SMDS) networks, said Deirdre Kostick, a member of the technical staff in Bellcore's broadband data services organization.

"The public network provider wants to ensure that customer information is not accessed by unauthorized users," Kostick said.

SMDS and SNMP are a logical match because the service providers are targeting SMDS as a service for interconnecting LANs in which SNMP is prominent.

Bellcore has proposed SNMP security in its SMDS Customer Network Management Service document, which defines SMDS services for users. The document includes ways for users to control who sends and receives data using SMDS.

SMDS, a switched service that can link LANs and computers at speeds of 1.2M to 34M bit/sec, is expected to become available in the first half of 1993. SNMP security for SMDS would come sometime afterward, Kostick said.

Peace of mind

For many SNMP users, the growing complexity of networks makes SNMP security a necessity.

"As networks become more complicated and have more connections, there will be a lot more ways to breach security," said Houghton LeRoy, principal network engineer for Foxborough, Mass.-based The Foxboro Co., which runs Lexcel's SNMP-based Lance software.

"We are looking to upgrade our SNMP management station with security," LeRoy said. "In this age of viruses, worms and hackers, you have to be aware of what's going on in the network."

And paying for security is like paying for insurance, said another network manager who requested anonymity. "It boils down to risk vs. spending. How much are you willing to pay for insurance?" asked the network manager.

It is unclear just how much an SNMP security upgrade will cost, SNMP vendors said. Security is likely to be added to the next releases of SNMP management products, they said.

So far, there are at least four SNMP security implementations in the works. Many vendors are expected to use one of these implementations to add security to the SNMP-based products sold to end users.

SNMP Research and Hughes LAN Systems, Inc. are working on separate implementations. Renowned SNMP guru Marshall Rose, principal of Dover Beach Consulting, Inc. in Mountain View, Calif., is developing one public domain version for the ISO development environment, and Carnegie-Mellon University in Pittsburgh is working on another.

All four are awaiting final word from the IAB before making their offerings available. SNMP Research, which announced its offering last year, plans to ship its product when the drafts become proposed standards.

If the IAB keeps to its current schedule in accepting the drafts, a new generation of secure SNMP managers should become widely available by 1993, industry experts said.

Jackson Higgins is a freelance writer based in Stanardsville, Va.

Wellfleet increases port capacity

By Maureen Molloy
Senior Writer

BEDFORD, Mass. — Wellfleet Communications, Inc. last week announced a new module that doubles the number of token-ring ports on its bridge/routers.

In addition, the company will begin implementing Madge Networks, Inc.'s Fastmac software on all token-ring modules to boost data transfer to up to 8,400 packet/sec — a fourfold increase.

Configurable for 4M and 16M bit/sec token rings, the new Dual Token-Ring Module boosts from four to eight the number of token-ring ports on the four-slot Link Node and Backbone Link Node bridge/routers, and from 13 to 26 the number on the Concentrator Node and Backbone Concentrator Node.

> "The growth of token ring is driving the demand for increased token-ring connectivity."

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Karen Barton, Wellfleet's director of product marketing, said the new module effectively lowers users' per-port costs. "The growth of token ring is driving the demand for increased token-ring connectivity," she said.

Several other internetworking vendors, including Cisco Systems, Inc., CrossComm Corp. and Proteon, Inc., have also introduced dual token-ring cards this year.

Wellfleet's new module, as well as its existing token-ring modules, will come equipped with Fastmac. The software minimizes the number of Direct Memory Access operations required for frames to be transferred from one port to another. That reduces processing demands and enables the module to read and write data more efficiently. Network response time improves because the module can handle more packets per second.

The Dual Token-Ring Module is available now and includes all bridge/router software. A Feeder Node configured with the module costs $10,495, while a Link Node configuration starts at $16,250.

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With HP network-ready LaserJet printers, you can monitor your network right from your desk.

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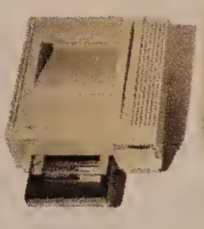

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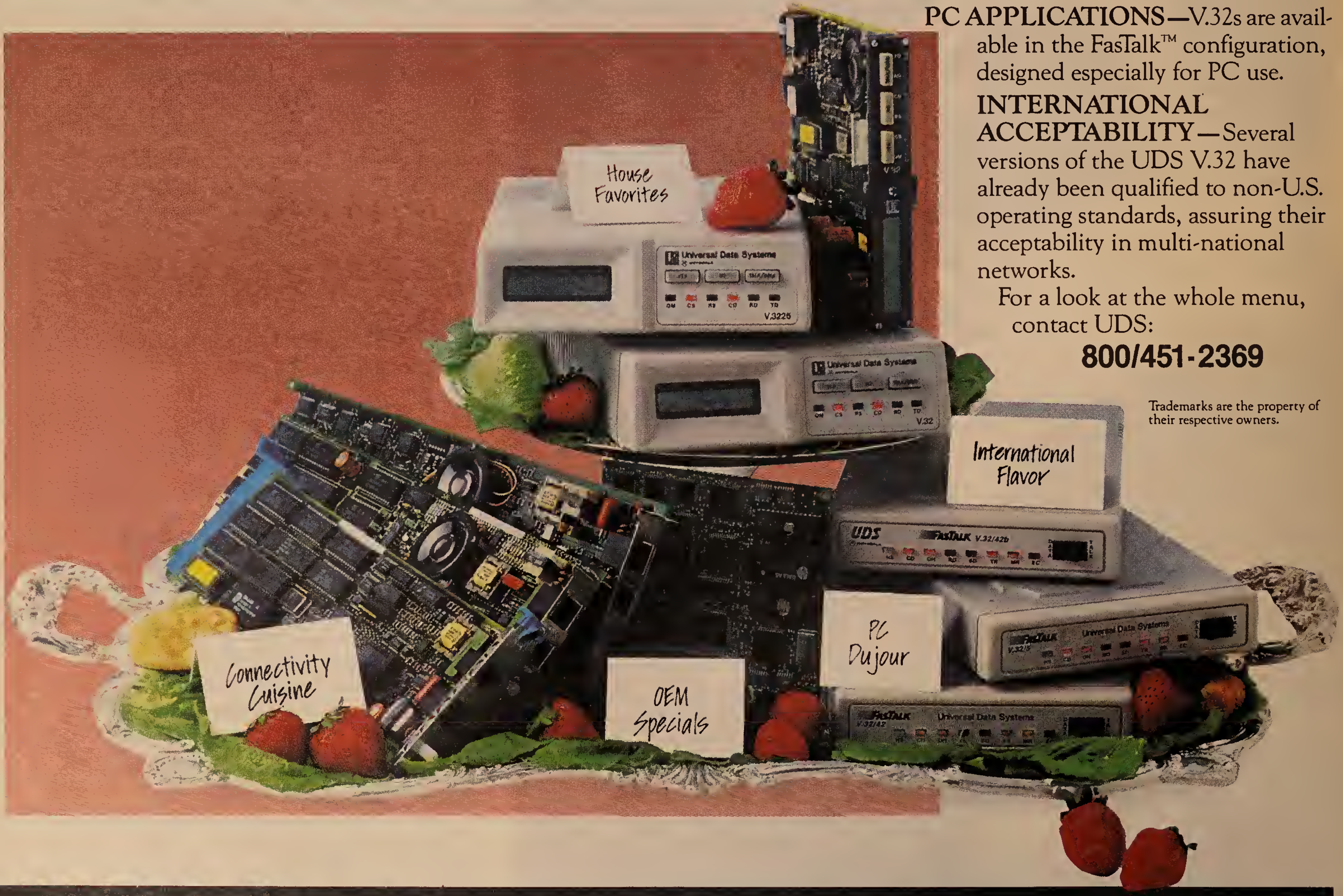

UDS

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DATA NET ARCHITECTURES

NETWORK ARCHITECTURES, DATA NETWORK EQUIPMENT, STANDARDS AND ENTERPRISE NETWORK MANAGEMENT

Worth Noting

Sixty-seven percent of all faxes transmitted by Fortune 500 firms are sent long distance, but only 1% of those users send their documents at the most cost-effective time, according to a Gallup Organization study commissioned by Pitney Bowes, Inc. of Stamford, Conn.

Data Packets

Bell Atlantic Software Systems last week rolled out DECnet Phase IV routing software that can be ported to different hardware and operating system platforms.

The Bell Atlantic Comm-Unity Router lets users establish a DECnet backbone network to interconnect local-area networks or to let standalone systems share network devices. Users can also route data and electronic mail across LANs and wide-area networks using the software.

Source licenses of Comm-Unity Router are available now for end users, OEMs and systems integrators on a royalty basis based on the number of installed systems and the base system price. Licensing includes integration, training and support, documentation and product testing.

Digital Access Corp. of Reston, Va., last week announced a $12 million private leasing offer that will let users combine the company's Fracdial inverse multiplexer and Virtual Bridge products along with their choice of video coder/decoder in a single leased package. The program lets Digital Access be a one-stop shop for users growing video conferencing networks. ◼

NTI outfits DPN-100 switch with frame relay support

Firm also inks deal to resell Wellfleet router line.

By Michael Cooney
Senior Editor

RESEARCH TRIANGLE PARK, N.C. — Northern Telecom, Inc. has introduced frame relay software for its DPN-100 packet switch and a deal to resell Wellfleet Communications, Inc. routers, developments that will allow customers to migrate to high-speed data services and consolidate existing nets.

The frame relay software will let the DPN-100 support port speeds of up to T-1 and enable customers to build local-area internetworks utilizing the same wide-area facilities that currently support Systems Network Architecture and X.25 traffic, analysts said.

It will also let carriers that use the DPN-100, such as BellSouth Corp. and US West, Inc., deploy frame relay offerings.

More bang for the buck

For end users, the frame relay support coupled with the Wellfleet routers will give Northern Telecom a turnkey internet offering, said Berge Ayvazian, vice-president of communications research for The Yankee Group, a Boston-based consultancy.

"There is a tight synergy between these two companies, and the products and services they offer will let large DPN-100 customers grow larger, more efficient networks," he said. "Users will get more bang out of their wide-area networking buck."

Northern Telecom will resell three of Wellfleet's routers under the DPN-100 Router nameplate: Wellfleet's Feeder Node, supporting two local-area network and two WAN interfaces; Backbone Link Node, supporting 16 LAN and WAN interfaces; and Backbone Concentrator Node, supporting 52 LAN and WAN interfaces.

Northern Telecom also announced Simple Network Management Protocol software for the DPN-100 that will enable management of the Wellfleet routers from a centralized workstation.

(continued on page 15)

NatSemi set on global video tack

By Ellen Messmer
Washington Correspondent

SANTA CLARA, Calif. — National Semiconductor Corp. (NatSemi) has installed a global videoconferencing system that uses Teleos Communications, Inc.'s VideoHub to support a mix of public and private network services.

Judith Hamilton, NatSemi's senior network manager on the videoconferencing project, said the Teleos VideoHub Series 7000 supports multipoint videoconferencing sessions in which domestic sites are supported by the company's private T-1 net while its Tokyo site is tied in via switched Integrated Services Digital Network links.

"We can switch back and forth between dedicated and switched access," Hamilton said.

Due to the success of the two-month-old system, the company plans to add at least six more international videoconferencing sites in the next two years.

Last September, NatSemi launched its domestic videoconferencing system using Compression Labs, Inc. (CLI) coder/decoders to communicate at 384K bit/sec over its private T-1 net between offices here and in South Portland, Maine. Hamilton said videoconferencing application saved so much in travel costs and executive time that the company, which has 32 international manufacturing plants and offices, decided to expand the system globally.

NatSemi decided on Tokyo as its first international videoconferencing site, but the cost of a private line to Japan was prohibitive. Instead, the company acquired an AT&T Primary Rate Interface (PRI) access line from its headquarters here to a local AT&T point of presence and installed the Teleos VideoHub. A Basic Rate Interface line was installed at the Tokyo location.

The PRI line provides access

(continued on page 15)

HP opens OpenView 3.X

General features:

HP OpenView Windows
- DME GUI API
- More powerful, customizable GUI

CM-API
- Distributed management
- Access to multiple DME management protocols (SNMP and CMIP)
- Basis for X/Open Company, Ltd.'s X/Open Management Protocol

Specific features:

HP OpenView Release 3.0 – 2Q
- HP OpenView Windows API
- SNMP Management Services
- Direct SNMP API

HP OpenView Release 3.1 – 3Q
- HP OpenView Windows API
- Direct SNMP API
- CM-API access to SNMP and CMIP over TCP/IP

HP OpenView Release 3.2 – 4Q
- CM-API access to CMIP (X.700)

API = Application program interface
CM = Consolidated Management
CMIP = Common Management Information Protocol
DME = Distributed Management Environment
GUI = Graphical user interface

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: HEWLETT-PACKARD CO., FORT COLLINS, COLO.

Developers may rally 'round OpenView 3.X

Three software versions debut with APIs to aid application development, offer DME compatibility.

By Jim Duffy
Senior Editor

FORT COLLINS, Colo. — New application program interfaces (API) to be included in Hewlett-Packard Co.'s OpenView network and systems management software have analysts predicting widespread development of OpenView applications that run across various hardware platforms.

As expected, HP unveiled OpenView Versions 3.0, 3.1 and 3.2, which support technologies compatible with the Open Software Foundation, Inc.'s (OSF) Distributed Management Environment (DME) ("HP readies new versions of OpenView," *NW*, May 4). HP unleashed the three versions at once to provide users and developers a timetable for release of specific features (see graphic, this page).

The new versions also include developer's tool kits with APIs that make it easier for developers to write Simple Network Management Protocol-based applications as well as applications that take advantage of OpenView's new graphical user interface (GUI) and run on DME-compatible management systems (see graphic, page 14).

It is these APIs that will boost the appeal of the OpenView 3.X to application developers, analysts said. The APIs ease development of SNMP-based applications and offer DME compatibility, which promises a wide user base.

End users will ultimately benefit as developers compete to produce feature-rich management applications, said Nick Lippis, a principal with Strategic Networks Consulting, Inc. in Rockland, Mass.

James Herman, a principal with Northeast Consulting Resources, Inc., a Boston-based network consultancy, added, "HP's providing the kinds of features that users and developers want in an open management platform," such as SNMP API and hardware independence. (For more information on OpenView and other open management platforms, see "Looking for true openness in a closed world," page 53.)

Indeed, the new versions of OpenView are key to HP's strategy to be "the Microsoft of network and systems management," said Jeff Thiemann, OpenView program manager in HP's Colorado Networks Division. Like Microsoft and its pervasive Windows environment, HP wants developers to write network and systems management applications that can span a range of hardware platforms.

OpenView 3.X will run on HP's 9000 Series systems, IBM's RISC System/6000, Sun Microsystems, Inc.'s SunOS platforms and Unix-based processors from Groupe Bull SA, HP said.

HP's multiplatform strategy appears to be taking hold in the development community. First, OSF selected OpenView as the foundation for DME last September. In the last four months, the number of applications for the 3-year-old management platform increased from 40 to 100, Thie-

(continued on page 14)

Developers may rally 'round 3.X

continued from page 13

mann said. "We expect, literally, a flood of applications" following the release of the DME-compatible OpenView 3.0, 3.1 and 3.2, he said.

The increase in OpenView applications, as well as the OSF blessing, has also spurred demand from users. To date, HP has sold 8,000 OpenView licenses worldwide. But about 2,700 of those licenses were sold from November 1991 to March 1992, Thiemann said, just about the time OpenView 3.X applications were being written.

"We're well on track to more than double our installed base," Thiemann said.

In addition to the wealth of applications, much of the expansion in HP's installed base will be due to OpenView 3.X's compliance with the OSF DME, observers said. OpenView Version 3.X is the first management system to include DME-compatible technology.

Specifically, Version 3.X's OpenView Windows GUI was selected as the interface for OSF's DME.

Also, Version 3.1 will include the so-called Consolidated Management API (CM-API) — jointly developed by HP and Groupe Bull — which allows management applications and managed objects to communicate using SNMP or the Common Management Information Protocol (CMIP) over TCP/IP protocol.

The CM-API in Version 3.2 will support CMIP over the Open Systems Interconnection protocol stack.

The new OpenView GUI, meanwhile, includes a number of enhancements. It allows users to view their worldwide networks from an unlimited series of maps that offer progressively more detail.

Previously, OpenView Windows provided only three views of a user's network: interconnected networks, a single net and a local-area net segment.

The GUI also allows users to customize their view of the network. Instead of surveying the entire enterprisewide network, for example, network managers can opt to view only the city or network domain of their choice.

The new OpenView Windows GUI also allows users to predefine tasks, such as creating a graph to show net traffic levels, representing them as icons on the screen. By clicking on the icon, the user can execute the task.

Meanwhile, the non-DME features of OpenView 3.X include what HP refers to as the SNMP Management Services and Direct SNMP API.

SNMP Management Services allow users to dynamically locate and display SNMP network devices, which aid network administrators in isolating and correcting net problems. The Direct SNMP API allows developers to write management applications that use the SNMP Management Services features and exchange information between SNMP devices and OpenView.

Previously, users had to purchase OpenView's Network Node Manager application to access SNMP Management Services. Network Node Manager provides fault, configuration and performance management of TCP/IP networks.

Although HP unbundled SNMP Management Services from Network Node Manager, the company also unleashed a new version of the application, Network Node Manager 3.0, which can send alarms to remote locations. ◻

HP's OpenView pricing

Product	Price	Developer's tool kit price	Availability
OpenView 3.0	$7,000	$12,500	June
OpenView 3.1	$8,000	$23,000	Third quarter
OpenView 3.2	NA	NA	Fourth quarter
Network Node Manager 3.0	$15,000	None	June

NA = Not available

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: HEWLETT-PACKARD CO., FORT COLLINS, COLO.

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Switch supports frame relay

continued from page 13

According to analysts, the system management features, combined with Northern Telecom's relatively easy DPN-100 migration path, should make this frame relay router package a strong player in the internet arena.

"Northern Telecom has always had a strategy of letting users upgrade to new technologies without causing them a lot of trouble," said Rebecca Diercks, a senior industry analyst with Business Research Group in Newton, Mass. "These new products and services should be no different."

The DPN-100 frame relay software is available now for $70,000. In its base form, it can support 160 56K bit/sec to 20 T-1 ports. The routers are available with pricing ranging from $7,000 to $80,000, depending on configuration. ◘

NatSemi set on video tack

continued from page 13

to both the private T-1 net and international switched services. To reach Tokyo, NatSemi can employ the inverse multiplexing features of the VideoHub to dial-up two AT&T international switched 64K bit/sec lines simultaneously for a videoconferencing session at 128K bit/sec.

John Boreni, manager of worldwide network planning at NatSemi, said the company selected the Teleos VideoHub because it was evaluated as the best device for accessing multiple types of carrier services via a PRI line.

Hamilton said that during the next two or three years, the company plans to install CLI video codecs in a number of other sites, including Germany, Hong Kong, Israel, Malaysia, Scotland and Singapore. ◘

Tool helps configure data centers

By Michael Cooney
Senior Editor

VALHALLA, N.Y. — Keeping track of large data center network configurations can be like counting raindrops in a hurricane.

A new software product from The Graphic Management Group, Inc. will help simplify that task. Enterprise Configuration Manager (ECM) lets users view, track and plan the connections between mainframes in the data center and attached devices.

ECM is an IBM SystemView-compliant configuration planning tool that runs on a personal computer connected to the mainframe or on a stand-alone PC.

To use ECM, data center managers enter configuration information. ECM then stores the information and prints configuration reports that managers can use to plan or change their data center layouts.

Prior to ECM, data center managers had to produce diagrams and reports manually, said Rob Trenck, director of marketing for The Graphic Management Group.

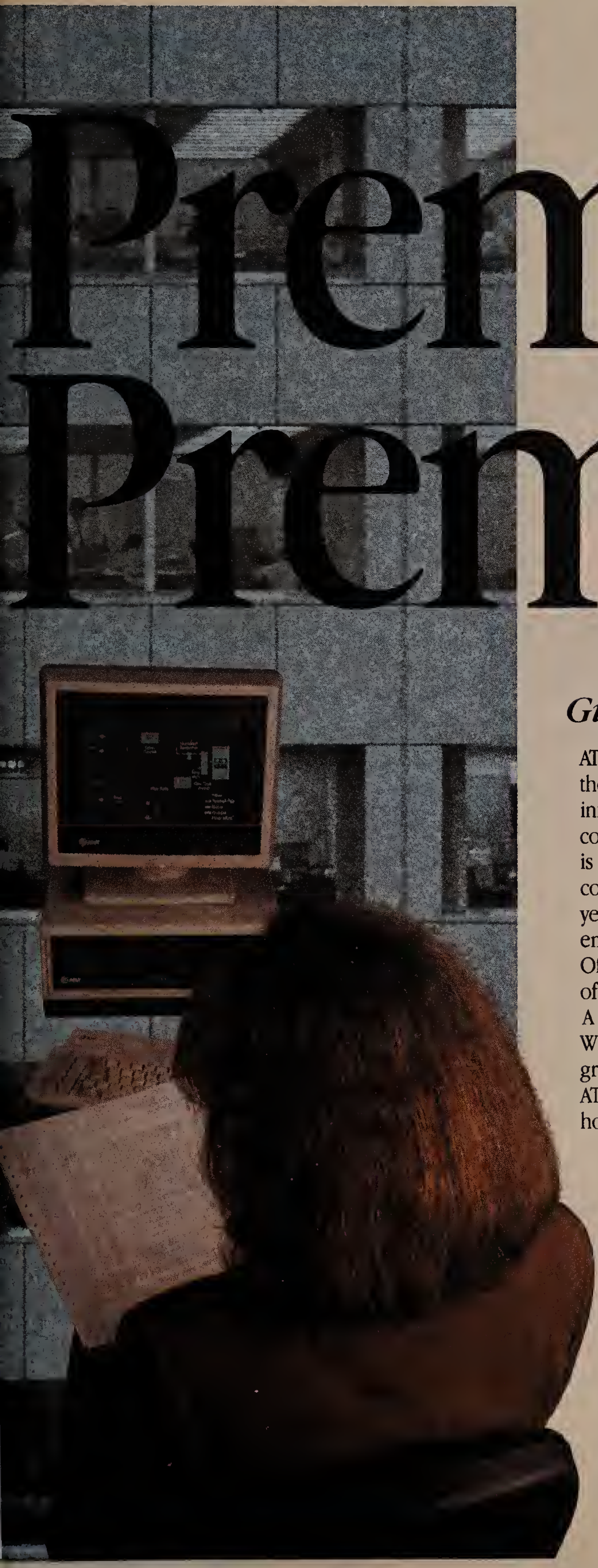
ECM lets users experiment with configuration designs before committing money for new products, analysts said. Also, because ECM is SystemView-compliant, it can be used with other vendors' SystemView management tools to give users a complete view of their data center.

The product should be especially useful for those users moving from the traditional bus-and-tag mainframe channel connections to IBM's Enterprise System Connection (ESCON) architecture, according to analysts.

ESCON is IBM's fiber-optic mainframe channel connectivity architecture that supports mainframe channel speeds up to 17M bit/sec. It allows mainframes and attached direct-access storage devices, controllers or other devices to be as far as 12 miles apart, or 36 miles with repeaters. Previously, such connections were limited to less than a mile.

On the downside, ECM can be time-consuming to set up. Entering all the data center's components into the program can be tedious. The product also does not tell users the cost of the alternatives it proposes.

ECM is available now and runs on a DOS-based 80286 PC. It costs $7,500 for a System/370-based mainframe and an additional $2,500 for a System/390-based version. ◘



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LOCAL NETWORKING

LAN HARDWARE, NETWORK OPERATING SYSTEMS AND LAN MANAGEMENT

Worth Noting

"NetView and [DEC Management Control Center Director] have been ballyhooed for years, but few net managers are buying them to manage LANs. Enterprise managers don't [deliver value for the money]; current versions are alarm traps for a limited set of devices."

Janet Hyland
Director of network
strategy research
Forrester Research, Inc.
Cambridge, Mass.

Netnotes

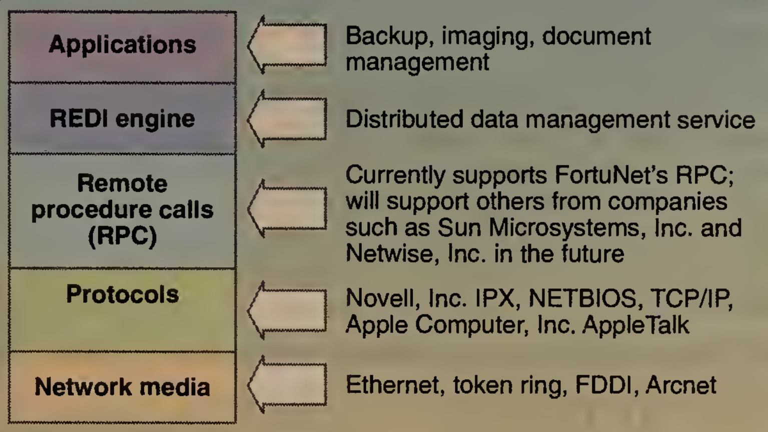
Novell, Inc. last week officially announced its Burst Mode Protocol, a new standard that maximizes existing network bandwidth by improving the way data packets are sent over both local- and wide-area networks using the company's Internetwork Packet Exchange (IPX) protocol.

Previously referred to as Packet Burst IPX, the Burst Model Protocol is implemented via software consisting of a NetWare Loadable Module for the server and a new shell for the DOS client. The combination will let users send information in 64K-byte blocks back-to-back without the need for acknowledgments. Previously, a request/response was required for each packet sent.

The Burst Mode Protocol is available now through NetWare Express to customers who subscribe to Novell's NetWare Software Maintenance program. There is no charge for the Burst Mode Protocol, but minimal connect charges do apply. The new protocol is included in Novell's Multipro-

(continued on page 20)

REDI layer to bridge gap between network applications, platforms


Applications
Backup, imaging, document management
REDI engine
Distributed data management service
Remote procedure calls (RPC)
Currently supports FortuNet's RPC; will support others from companies such as Sun Microsystems, Inc. and Netwise, Inc. in the future
Protocols
Novell, Inc. IPX, NETBIOS, TCP/IP, Apple Computer, Inc. AppleTalk
Network media
Ethernet, token ring, FDDI, Arcnet

FortuNet's Real Electronic Data Interchange (REDI) engine will let developers formulate applications that can retrieve, store and manipulate data, regardless of the PC operating systems, network operating systems, protocols or net media types involved.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FORTUNET, INC., SALT LAKE CITY

Tool kit offers uniform access to networked data

Provides common foundation for applications.

By Margie Wylie
Senior Editor

SALT LAKE CITY — What do LAN Manager, NetWare and Unix networks have in common when it comes to creating applications? Almost nothing, according to FortuNet, Inc.

That's why the company last week introduced Real Electronic Data Interchange (REDI), a developers' tool kit that offers a single application program interface (API) for locating, retrieving and saving data over a network, regardless of the type of personal computer or server the data resides on, how the data is stored or what network protocols are used.

> REDI offers application writers a consistent set of rules and APIs.
>
> ▲▲▲

The first REDI software developers' tool kits, scheduled to be available later this year, will be for DOS nodes and Network Basic I/O System nets. Later versions will support Unix, Macintosh and NetWare servers as well as a variety of protocols, according to Richard Watson, president of FortuNet and REDI's creator (see graphic, this page).

"With the evolution of LANs into Fortune 1,000 companies, you have a situation where you're winding up with heterogeneous devices on the same LAN and even different [network operating systems] and protocols on the same network," Watson said.

That leaves the corporations unable to manage their networked data effectively. "To date, no NOS vendors have come out and said, 'This is how you manage data in very ubiquitous fashion,' " Watson said. REDI is poised to fill that gap.

Running at the presentation layer of the Open Systems Interconnection model, REDI offers application writers a consistent set of relatively simple rules and APIs for passing data in a mixed environment.

The Source and Target portions of REDI manage the locating and passing of data from point to point. The Manager portion allows developers to create applications that can be controlled and monitored from a central point. Developers write applications to the REDI specification and load the appropriate REDI components on nodes or servers to create an application that can run across any environment REDI supports.

Using REDI, an application could theoretically grab or manipulate data objects over the

(continued on page 18)

Low-cost LANalyzer makes market debut

Novell targets low-end users with new version of its net monitoring tool, scaled-down NetWare NFS.

By Caryn Gillooly
Senior Editor

SAN JOSE, Calif. — Taking aim at customers with smaller networks, Novell, Inc. last week released a low-cost version of its LANalyzer network monitoring tool and a scaled-down version of NetWare NFS, its Unix connectivity product.

Both products offer functionality similar to that of Novell's higher end offerings but are more NetWare-centric and cost as little as one-tenth the price of the original products.

The new network analyzer, called LANalyzer for NetWare, costs $995 to $1,495 and is a NetWare-specific version of Novell's existing LANalyzer product that costs upwards of $12,500.

The new low-cost Unix connectivity product is called FLeX/IP Version 1.2. It provides users with virtually the same functionality as NetWare NFS, except it does not support the Network File System (NFS) protocol. The $1,995 price tag, however, may make up for that, as NetWare NFS costs $4,995.

"Most people who buy LANalyzer and [Network General Corp.] Sniffer-type products are responsible for a fairly large network," said Duane Murray, vice-president and general manager of Novell's Network Management Products Division, based here. "They're responsible for the LAN, cabling, backbone, host connections and a lot more."

Customers with a local-area network that has fewer than 100 nodes are often locked out of buying network analysis tools because existing products are typically difficult to use and expensive. "We wanted to come up with something for the average NetWare LAN run by a normal department administrator, not a scientist," Murray said.

LANalyzer for NetWare is a

(continued on page 19)

QuickRing may turn Macs into high-powered servers

By Margie Wylie
Senior Editor

SAN JOSE, Calif. — A technology designed to make life easier for video artists could also transform existing Macintoshes into heavy-duty servers without breaking the bank.

Apple Computer, Inc. introduced QuickRing at its annual developer's conference here last week. The product is an extension to the Macintosh's NuBus, which boosts throughput from approximately 10M byte/sec to over 200M byte/sec.

That added capacity will make it possible for Macintosh users to take advantage of high-speed networking technologies such as Fiber Distributed Data Interface and Asynchronous Transfer Mode, which can deliver data faster than conventional buses can accept it, said Paul Sweazey, project manager for QuickRing.

Macintoshes that can absorb all the data sent over a high-speed link will provide the perfect platform for advanced applications, such as the ability to send, manipulate and display full-motion video locally or over a network, according to Pieter Hartsook, editor of The Hartsook Letter, a Macintosh market research service located in Alameda, Calif.

QuickRing creates a redundant "data freeway" in the Macintosh next to the existing internal data bus. "It's like having both city roads and freeways for the two different kinds of traffic," said Sweazey. It is also 10 times cheaper than alternative proposals being considered by standards committees and inside Apple, according to Sweazey.

For the typical net manager, however, QuickRing's promise may lie not in high-powered video workstations, but in the multiprocessor servers that could be

(continued on page 18)

DeskTalk applications add to SunNet Manager features

By Caryn Gillooly
Senior Editor

TORRANCE, Calif. — DeskTalk Systems, Inc. has introduced two applications for SunConnect's SunNet Manager, one designed to work with Novell, Inc. net monitoring devices and another that integrates net management information in the corporate database.

With the new Remote Monitor Services Manager (RSM), administrators using SunNet Manager will be able to collect information from Novell LANtern monitoring devices and display the data in Novell format on the SunNet Manager console. And with the new DataPipe software, administrators will be able to integrate that information, as well as other network management data, into the corporate database.

Novell's LANtern is a hardware-based net monitoring device that acts as a network agent, said David Kaufman, president and CEO of DeskTalk, based here. In a typical enterpise, LANterns would be situated throughout the network — one on each segment, for instance — all sending information back to a central software-based console, such as Novell's LANtern Services Manager.

With RSM, the central component runs on the SunNet Manager platform alongside element management systems for other net components. It collects, records and interprets the data gathered from Novell's LANtern network monitors and, if a problem is detected, automatically generates a real-time alert.

"This is a highly integrated SunNet Manager application," Kaufman said. "A lot of applications provide integration at the launch level — you have to click on an icon for it to run — but this automatically updates information within SunNet Manager based on what it discovers itself."

DataPipe is also used to ease network management tasks. It is a relational database management interface that lets the administrator store collected network management information in the corporate database. According to Kaufman, it supports Informix Software, Inc., Oracle Corp. and Sybase, Inc. databases.

Once the information is stored, DataPipe lets a net administrator access the data and provides the facilities to generate various types of reports. DataPipe also lets an administrator use spreadsheets, such as Lotus Development Corp.'s 1-2-3, to retrieve information and create graphic presentations.

Pricing for RSM, which is available now, starts at $1,995. DataPipe is also available now and costs $995 for the basic package or $1,495 when bundled with a full Sybase SQL Server run-time database.

Turning Macs into servers

continued from page 17

built from existing NuBus Macintoshes using the inexpensive technology.

Because widening the data path into a computer provides more room for processing power, it would be a fairly simple task for Apple or another vendor to mount additional CPUs on QuickRing NuBus cards and turn the Macintosh into a multiprocessor powerhouse. That is a use Apple's Enterprise Systems Division is investigating.

Apple is also exploring how the technology might help it create redundant servers, similar to LAN market leader Novell, Inc.'s System Fault Tolerance Level-III. Of course, the hardware would be useless without server software that takes advantage of multiple processors or a link that would mirror servers. Apple remained mum on whether it will consider updating its existing AppleShare 3.0 to meet the task.

QuickRing's components will be available for third-party vendors to create their own products early next year. Apple officials declined to comment on when users might expect to see QuickRing integrated into the Macintosh but said it will eventually ship as a standard component.

Tool kit offers uniform access

continued from page 17

network without knowing whether the data is on an Apple Computer, Inc. Macintosh on an AppleTalk network or a Microsoft Corp. Windows NT server on a LAN Server network.

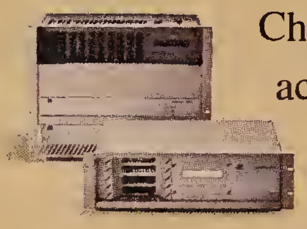
For example, FortuNet has created its own backup program based on REDI, called NSure, which can back up and restore both LAN Manager and NetWare server files from a single DOS machine, Watson said. The company will be demonstrating the program this week at INTEROP 92 Spring in Washington, D.C. The product runs from $175 for stand-alone devices to $1,895 for jukeboxes.

NSure uses REDI's Manager in an application that can monitor and control backup processes anywhere on the network from a single node.

"Our Manager is a unique component that will put data control back into the hands of the corporation," Watson said.

REDI currently works with FortuNet's own remote procedure calls (RPC), which execute data moves and perform necessary translations between file or protocol formats. Future versions will support popular RPCs from Sun Microsystems, Inc., Netwise, Inc. and other companies, according to FortuNet.

Pricing for the REDI developers' kit has not been determined.



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New LANalyzer makes debut

continued from page 17

Microsoft Corp. Windows-based application that runs on any Intel Corp. 80386 or higher workstation on the LAN. The original LANalyzer is not Windows-based and resides on a portable computer that the administrator physically brings to the site of a network problem.

As it is designed for smaller LANs, LANalyzer for NetWare only supports NetWare-specific and Apple Computer, Inc. AppleTalk Phase 1 and 2 protocols. The original LANalyzer supports these in addition to the Internet Protocol, IBM's Systems Network Architecture, Digital Equipment Corp.'s DECnet and Open Systems Interconnection.

According to Murray, the only other capability in the original LANalyzer that was omitted from LANalyzer for NetWare is the Automated Troubleshooting System, a high-level, rules-based program that gives the administrator in-depth cause/solution scenarios for complicated network problems.

According to Murray, this type of sophisticated analysis is generally not necessary for departmental use. "LANalyzer for NetWare will just tell you, for example, that the server is overloaded," Murray said. "It assumes if you need more information, you'll get it elsewhere."

NetWare FLeX/IP Version 1.2, a set of NetWare Loadable Modules for use in NetWare 3.X-based LANs, was developed with a similar set of users in mind, according to Rick Bohdanowicz, product-line manager at Novell.

"Users told us they wanted to be able to buy Unix print gateway, file transfer and X Window [System] capabilities in a separate, low-cost package," he said. FLeX/IP offers exactly these features.

It gives users file-transfer capabilities between NetWare clients and a Unix server using the File Transfer Protocol (FTP) and offers bidirectional print capabilities between Unix and NetWare clients and printers. It also lets Unix administrators manage NetWare LANs using the X Window graphical user interface.

FLeX/IP does not, however, support NFS. This means that although users can transfer files using FTP, they must request a specific file from a specific machine.

LANalyzer for NetWare and FLeX/IP are available now. ◘

Pack lets Novell users group files into electronic folders

By Salvatore Salamone
Features Writer

HACKENSACK, N.J. — PaperClip Imaging Software, Inc. has released software that allows PC users on Novell, Inc. NetWare LANs to group text, image and other files related by some common element for easy reference and manipulation.

The PaperClip Software Document Imaging System lets users build electronic folders containing all documents connected to a particular record. For instance, folders based on customer account numbers could contain all text files, electronic mail messages, facsimiles and images of all documents pertaining to each client. Other folders might contain all files and documents related to a single project.

PaperClip operates as a back-end product to existing applications. For example, a user might look up a record in a database program such as Borland International, Inc.'s dBase IV. Once a particular customer is found, the user can hit a hot-key combination to invoke PaperClip, which will present a list of all files, images, E-mail messages and faxes associated with the customer.

To access a file or image, a user enters the corresponding article number and PaperClip then launches the application needed to view the item. One example would be typing the article number to launch WordPerfect in order to bring up a letter for viewing or editing.

If the user wants to see an image, entering the number associated with the image will display it on the workstation's screen. This is all done while keeping the original session — in this example, a dBase session — alive.

Folders are created by scanning the documents into the system, using the company's Batch Scanning Module, then manually assigning each document to one or more folders.

Tapping mainframe data

While designed for stand-alone personal computers and those on NetWare local-area networks, PaperClip also allows users to access data and images stored on mainframes and minicomputers.

PaperClip can tie in with an IBM Application System/400 imaging system, for example, via a terminal-emulation program. PaperClip runs on the LAN-attached workstation, which is running a terminal-emulation program that provides access to the AS/400.

PaperClip runs on DOS and Novell NetWare PCs with a minimum of 3M bytes of random-access memory and a video graphics adapter monitor. Compatible printing and imaging equipment include a Hewlett-Packard Co. LaserJet II or compatible printer that uses a LaserMaster LXI or APT card; a Fujitsu Computer Products of America or compatible digital scanner that uses LaserMaster SXI or APT card; and a Small Computer System Interface or write once, read many times (WORM) optical disk storage system or jukebox.

PaperClip is available through distributors, LAN value-added resellers and systems integrators. Single and multiuser versions of the product range in price from $1,995 to $10,850, which includes optical subsystem support. ◘

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Netnotes

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tocol Router and its NetWare Workstation Kit for DOS/Windows.

Network Systems Corp. this week at INTEROP 92 Spring in Washington, D.C. is expected to take network management one step beyond bits and bytes with the release of Usage Sensitive Billing, a program designed to help administrators establish a policy to bill end users according to their network usage.

The product consists of Usage Sensitive Billing Program (USBP) software, as well as consulting, training and implementation services.

The USBP software runs on a Sun Microsystems, Inc. SPARCstation 2 and uses the X Window System graphical user interface.

The package is available now starting at $22,500.

Harris Adacom Corp. today unveiled CoaxNet, a local-area network bridge that can support 32 personal computers outfitted with 3270 coaxial cable boards and links them to an Ethernet- or token-ring-based Novell, Inc. NetWare LAN. The bridge provides full NetWare services to the coaxial cable-attached PCs as if they were directly connected to the LAN.

CoaxNet for Token Ring is available now and is priced at $8,000, while CoaxNet for Ethernet, also available now, costs $7,000. For more details, contact Harris Adacom at (214) 386-2000.

Pilkington Communications, Inc. of White Plains, N.Y., will introduce a fiber-optic Ethernet transceiver, compact token-ring adapter card and a 10Base-T multiport repeater next month at PC Expo in New York. The repeater, called the Model 5001, will offer 12 twisted-pair and one attachment unit interface port. The adapter card, the Model 1101, can operate at either 4M or 16M bit/sec and can fit into a laptop personal computer. The fiber-optic transceiver, the Model 2212, supports fiber-optic Ethernet connections.

Pricing and availability have not yet been released.

Notorious for cluttering wiring closets and overheating when stacked, the most widely installed LocalTalk-to-Ethernet router last week got a face-lift. The new slim-figured FastPath 5R router from Cambridge, Mass.-based **Shiva Corp.** now mounts in a standard 19-in. equipment rack and runs at cooler temperatures that should prevent overheating.

The FastPath 5R will be available next month for $2,799, with a set of two priced at $5,399. FastPath 5 users can upgrade by installing their current router's systems board into a FastPath 5R casing, which costs $599. For $799, Shiva will perform the installation. FastPath 4 users can upgrade at $999 for one or $1,999 for two.

The Simple Network Management Protocol recently took a step forward on the Apple Computer, Inc. Macintosh. **Neon Software, Inc.** of Lafayette, Calif., recently released RouterCheck 2.0, an $895 program that can use SNMP to monitor and control LocalTalk-to-Ethernet routers, which are often used to connect Macintosh networks.

Version 2.0 also supports Ex Machina's Notify! software, a $399 package that lets RouterCheck issue alerts through a pager. SNMP support, however, is more promise than practicality at this point. Since Apple and the Internet Engineering Task Force have yet to bless a final full-featured SNMP specification, information and controls available through the protocol are severely limited. Therefore, RouterCheck 2.0 continues to support proprietary management protocols from all of the major router vendors.

Microsoft Corp. and **Wonderware Software Development Corp.** have struck a technology agreement that will put Wonderware's NetDDE into the hands of Microsoft Windows users by year end.

A network version of Microsoft's technology for passing information between applications, NetDDE is expected to be available with the upcoming Windows for Workstation package, a Windows 3.1 bundle that will include peer-to-peer networking, electronic mail and support for multiple redirectors on one network card.

ON Technology, Inc. next month will ship an upgrade to its Status*Mac Apple Computer, Inc. Macintosh management program. Status*Mac Version 3.0 will let managers not only profile a Macintosh's hardware and software over a network, but also execute upgrades remotely. The new version will also profile PostScript printers, and it offers several interface enhancements, according to Cambridge, Mass.-based ON Technology. Status*Mac 3.0 will sell for $749 for a 25-user pack and $2,699 for 100 users. ☐

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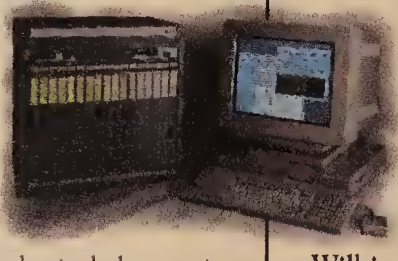

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1 **Industry: (check one only)**

01. ☐ Manufacturers (other than computer/communications)
02. ☐ Finance/Banking
03. ☐ Insurance
04. ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
08. ☐ Retail/Wholesale Trade
09. ☐ Transportation
10. ☐ Utilities
11. ☐ Education
12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
13. ☐ Government State/Local
14. ☐ Government Federal
15. ☐ Military
16. ☐ Aerospace
17. ☐ Consultants (Independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/Systems House
22. ☐ Distributor, Computer Related
23. ☐ Distributor, Communications Related
24. ☐ Other ______________________

2 **What is your job function? (check one only)**

NETWORKING MANAGEMENT

1. ☐ Networking Mgmt
2. ☐ LAN Mgmt
3. ☐ Datacom/Telecom Mgmt
4. ☐ Engineering Mgmt

MIS MANAGEMENT

5. ☐ MIS, IS, IT, Mgmt
6. ☐ Engineering Mgmt

CORPORATE MANAGEMENT

7 ☐ Corporate Mgmt (CIO, CEO, Pres, VP, Dir, Mgr, Financial Mgmt)

8. ☐ Consultant (Independent)

9. ☐ Other ______________________

3 **What is the total number of sites for which you have purchase influence? (check one only)**

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1

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Pass-Along Qualification Form

4 **Check all that apply in columns A and B:**
A: I am involved in the purchase of the following products/services.
B: I plan to purchase the following products/services in the next 12 months.

	Involved A	Plan to Purchase B	
	A	B	**LOCAL-AREA NETWORKS**
01.	☐	☐	Local-Area Networks
02.	☐	☐	LAN Servers
03.	☐	☐	LAN Operating Systems Software
04.	☐	☐	Superservers
05.	☐	☐	Data Base Servers (Oracle, Sybase, etc)
06.	☐	☐	Terminal Servers
07.	☐	☐	LAN Services
08.	☐	☐	LAN Storage Devices (Optical, Tape, Disk, Etc. including Backup Systems)
09.	☐	☐	Network Test Equipment
10.	☐	☐	Hubs
11.	☐	☐	Cables, Connectors, Baluns
12.	☐	☐	UPS
13.	☐	☐	Network Adapter Boards
14.	☐	☐	Central Office LANs
15.	☐	☐	Wireless LANs
16.	☐	☐	SNMP Network Management
	A	B	**INTERNETWORKING**
17.	☐	☐	Bridges
18.	☐	☐	Routers
19.	☐	☐	Gateways
20.	☐	☐	Bridge/Router
21.	☐	☐	Hubs
22.	☐	☐	Intelligent Hubs
23.	☐	☐	Communications Servers
	A	B	**COMPUTERS/PERIPHERALS**
24.	☐	☐	Micros/PCs
25.	☐	☐	Minis
26.	☐	☐	Mainframes
27.	☐	☐	Laptops
28.	☐	☐	Workstations
29.	☐	☐	Image Processing Workstations
30.	☐	☐	Front-End Processors
31.	☐	☐	Terminals
32.	☐	☐	Printers
33.	☐	☐	Cluster Controllers
34.	☐	☐	Fax Machines
	A	B	**SOFTWARE**
35.	☐	☐	Network Management
36.	☐	☐	Micro to Mainframe
37.	☐	☐	Network Security
38	☐	☐	Call Accounting
39.	☐	☐	Communication
40.	☐	☐	Word Processing
41.	☐	☐	Data Base Management
42.	☐	☐	Spreadsheet
43.	☐	☐	Groupware
44.	☐	☐	EDI
45.	☐	☐	E-Mail
46.	☐	☐	Windows/Graphical User Interface
47.	☐	☐	4-GL
48.	☐	☐	Multimedia
49.	☐	☐	Graphics
	A	B	**WIDE-AREA NETWORK EQUIPMENT/SERVICES**
50.	☐	☐	Modems (9.6kbps and over)
51.	☐	☐	Modems (under 9.6kbps)
52.	☐	☐	T-1
53.	☐	☐	T-3
54.	☐	☐	Fractional T-1
55.	☐	☐	Data Switches
56.	☐	☐	Matrix Switches
57.	☐	☐	Packet Switching
58.	☐	☐	Protocol Converters
59.	☐	☐	Network Management Systems
60.	☐	☐	Terminal Emulation Boards
61.	☐	☐	Diagnostic/Test Equipment
62.	☐	☐	DSU/CSU
63.	☐	☐	Data Compression Equipment
64	☐	☐	Microwave
65.	☐	☐	Fax Boards
66.	☐	☐	VSAT
67.	☐	☐	Fiber Optic
68.	☐	☐	Satellite
69.	☐	☐	ISDN
70.	☐	☐	PBXs (over 1000 lines)
71.	☐	☐	PBXs (200 - 1000 lines)
72.	☐	☐	PBXs (under 200 lines)
73.	☐	☐	Automatic Call Distributors
74	☐	☐	Voice Messaging Systems
75.	☐	☐	Videoconferencing Systems
76.	☐	☐	Central Office Switch
77.	☐	☐	Voice Response/Processing
78.	☐	☐	Switched Voice
79.	☐	☐	Dedicated Leased Line
80.	☐	☐	Digital Data
81.	☐	☐	Switched Data
82.	☐	☐	Centrex
83.	☐	☐	On-Line Information
84.	☐	☐	E-Mail
85.	☐	☐	SMDS
86.	☐	☐	Image Processing
87.	☐	☐	Audio Teleconferencing
88.	☐	☐	Local Services
89	☐	☐	WATS MTs
90.	☐	☐	International
91.	☐	☐	Virtual Networks
92.	☐	☐	Frame Relay
XX.	☐	☐	None of the above

5 **What are your primary responsibilities? (check all that apply)**

1. ☐ LANs
2. ☐ Internetworking
3. ☐ WANs

6 **What is the scope of your involvement in purchase decisions for Network products & services? (check one only)**

1. ☐ Enterprisewide (Organization/Subsidiary/Division)
2. ☐ Multienterprise (Consultants)
3. ☐ Departmentwide

7 **Is your network: (check all that apply)**

LOCAL AREA NETWORKS

1. ☐ Local (within building)
2. ☐ Local (in a campus environment)

WIDE AREA NETWORKS

3. ☐ International
4. ☐ National
5. ☐ Regional (several states)
6. ☐ Metropolitan

8 **Which of the following network architectures/protocols are used? (check all that apply)**

01. ☐ SNA
02. ☐ DECNET
03. ☐ OSI
04. ☐ GOSIP
05. ☐ MAP/TOP
06. ☐ TCP/IP
07. ☐ DCA (Unisys)
08. ☐ X.25
09. ☐ NOVELL IPX/SPX
10. ☐ APPC/APPN/LU 6.2
11. ☐ NETBIOS
12. ☐ DEC LAT
13. ☐ APPLETALK
14. ☐ OTHER

9 **What is your LAN Operating System? (check all that apply)**

01. ☐ LOCALTALK (APPLETALK)
02. ☐ BANYAN (VINES)
03. ☐ DCA (IRMALAN)
04. ☐ IBM (LAN SERVER)
05. ☐ IBM (PC LAN PROGRAM)
06. ☐ MICROSOFT (LAN MANAGER)
07. ☐ UNGERMANN-BASS
08. ☐ NOVELL (NETWARE, 2.X, 3.X)
09. ☐ PROTEON (PRONET)
10. ☐ SITKA (TOPS)
11. ☐ 3COM (3+, 3+OPEN)
12. ☐ Other ______________________

10 **What is your LAN environment? (check all that apply)**

1. ☐ 4M TOKEN RING
2. ☐ 16M TOKEN RING
3. ☐ ARCNET
4. ☐ ETHERNET
5. ☐ STARLAN
6. ☐ FDDI
7. ☐ LOCALTALK
8. ☐ 10BASE-T
9. ☐ OTHER ____________

11 **Are you involved in the implementation of client/server applications?**

Yes ☐ No ☐

12 **Which operating system do you utilize? (check all that apply)**

01. ☐ DOS
02. ☐ UNIX/XENIX
03. ☐ OS/2
04. ☐ OS/2 EX. ED.
05. ☐ MVS
06. ☐ VM
07. ☐ VMS
08. ☐ NUBUS
09. ☐ WINDOWS
10. ☐ OTHER

13 **For which areas outside of the U.S. do you have purchase influence? (check all that apply)**

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East

14 **Which of the following vendors equipment do you currently have installed in your network? (check all that apply)**

Vendor	Mainframes A	Minis B
01. DEC	☐	☐
02. IBM	☐	☐
03. AMDAHL	☐	☐
04. AT&T	☐	☐
05. BULL HNIS	☐	☐
06. NCR	☐	☐
07. DATA GENERAL	☐	☐
08. WANG	☐	☐
09. HEWLETT-PACKARD	☐	☐
10. PRIME	☐	☐
11. TANDEM	☐	☐
12. UNISYS	☐	☐
13. CONTROL DATA	☐	☐
14. OTHER	☐	☐

15 **Please indicate the number of Microcomputers/Workstations:**
A. Presently installed in your network.
B. The approximate quantity you plan to install in the next 12 months.

Micros/Workstations	Presently Installed A	Plan to Install Next 12 Months B
1. Macintosh	______	______
2. PCs Based on 80586 Chips	XXXX	______
3. PCs Based on 80486 Chips	______	______
4. PCs Based on 80386 Chips	______	______
5. PCs Based on 80286 Chips	______	______
6. PCs Based on 8086/8088 Chips	______	______
7. Risc-Based Workstations	______	______
8. Unix-Based Workstations	______	______

Use Numbers Only

16 **Estimated value of networking equipment and services:**
A. Which you helped specify, recommend or approved in the last 12 months?
B. Which you plan to help specify, recommend or approve in the next 12 months?

	A	B	
1.	☐	☐	$100 million and over
2.	☐	☐	$50 - $99.9 million
3.	☐	☐	$25 - $49.9 million
4.	☐	☐	$20 - $24.9 million
5.	☐	☐	$10 - $19.9 million
6.	☐	☐	$5 - $9.9 million
7.	☐	☐	$1 - $4.9 million
8.	☐	☐	$500,000 - $999,999
9.	☐	☐	Under $500,000

17 **Estimated gross annual revenue of your entire company/institution: (check one only):**

1. ☐ Over $10 billion
2. ☐ $1 to $9.9 billion
3. ☐ $500 to $1 billion
4. ☐ $100 to $499.9 million
5. ☐ $50 to $99.9 million
6. ☐ $10 to $49.9 million
7. ☐ $5 to $9.9 million
8. ☐ Under $5 million

18 **Estimated number of employees for your entire corporation:**

1. ☐ Over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ Under 500

9111

INTERNETWORKS

LAN-TO-LAN AND LAN-TO-WAN EQUIPMENT AND STRATEGIES

Worth Noting

> "IBM's [Network Control Program] does routing the way today's router vendors hope to do it in three to four years."
>
> **Anura Guruge**
> Lead consultant
> BBN Communications Corp.
> Cambridge, Mass.

Link Notes

Star-Tek, Inc. this week is expected to announce RMON Management Information Base (MIB) support for token-ring nets connected to its Focus Series Hub.

RMON, which is an extension of the Simple Network Management Protocol MIB II, provides a standard method for high-performance agents to track, store and analyze network traffic information.

The vendor will also unveil Star-Tek Network Management (STNM) Version 2.0, software that can manage all Star-Tek intelligent hubs and third-party devices supporting SNMP.

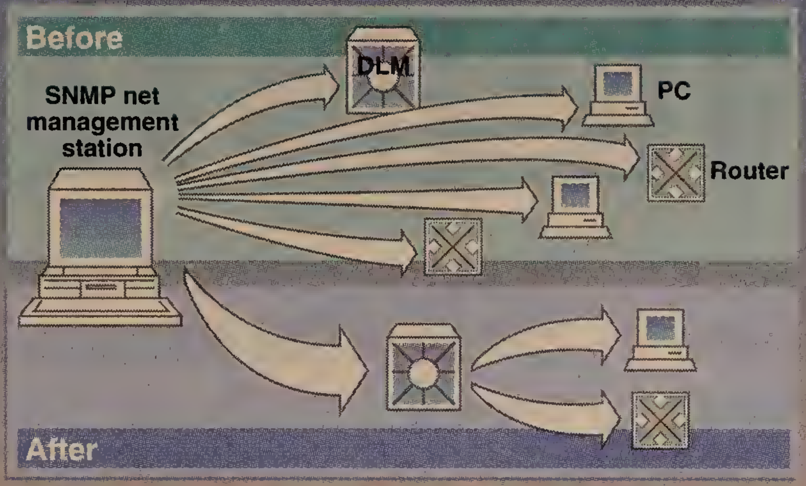
STNM Version 2.0 is available now and costs $2,995. For more information, call Star-Tek at (800) 225-8528.

Hughes LAN Systems, Inc. last week announced Monet Release 5.0, a new release of its net management software that supports the Open Software Foundation, Inc.'s Motif graphical user interface and X Window System.

The company also released Monet Lite, which offers all the features of Monet 5.0 in an entry-level package for networks with fewer than 75 Simple Network Management Protocol agents.

Monet 5.0 is priced at $14,950, while Monet Lite costs $7,450. Both will be available next month.

Cabletron's net congestion remedy



Cabletron's new Distributed LAN Monitor (DLM) software reduces network management data traffic by enabling hubs to poll locally attached devices for management information, leaving a centralized net management system to poll only the hubs.

GRAPHIC BY SUSAN J. CHAMPENEY SOURCE: CABLETRON SYSTEMS, INC., ROCHESTER, N.H.

Cabletron pack cuts down traffic from mgmt. polling

DLM runs on hub, takes advantage of RMON MIB.

By Skip MacAskill
Staff Writer

ROCHESTER, N.H. — Cabletron Systems, Inc. has announced new software for its intelligent concentrators that frees up wide-area network bandwidth by reducing net management polling traffic.

The optional Distributed LAN Monitor (DLM) feature will enable Cabletron hubs to locally poll and monitor any Simple Network Management Protocol-based device on an Ethernet local-area network for certain parameters such as file server CPU usage. The central management station then polls only the hubs, as opposed to every networked device, thus reducing WAN traffic.

"If a net manager has to poll 10,000 nodes on a network, problems such as inefficient net performance, bandwidth consumption and traffic congestion can occur," said David Cullerot, Ethernet product manager at Cabletron, based here. "The DLM feature increases the net's overall performance because it distributes monitoring functions among strategically placed hubs, thereby reducing the number of devices a manager must poll for status information."

Designed for Cabletron's new MRXI-24 hub and four-port Ethernet Management Module, DLM runs on the hub and takes advantage of the RMON Management Information Base (MIB). That specification is an extension of SNMP MIB II, which provides a standardized method for tracking, storing and analyzing network management information culled from remote devices.

With Cabletron's implementation, changes to the managed devices are not required to use the RMON MIB, as is the case with many other implementations.

RMON lets users set more sophisticated thresholds than can be set with just SNMP. If a net manager is monitoring a point-of-sale network, for instance, a threshold can be set to trigger an alarm when a circuit is being utilized above a certain percentage of its total capacity. If that so-called comfort zone is exceeded, DLM will notify the network manager.

"The ability to provide more than typical 'I am here' information by remote network devices is a great leap forward in moving beyond the simple nature of SNMP," said Douglas Gold, director of communications research for International Data Corp., a market research firm in Framingham, Mass. "Subsequently, the ability to poll individual devices and collect performance statistics without implementing an RMON MIB on that device can keep networking costs down."

RMON is divided into 10 groups that offer such functions as maintenance of performance summary tables and storage of LAN management information for later review. Cabletron cur-

(continued on page 26)

Retix router offers ATM, RISC support

New high-end router has five RISC processors, will be industry's first to support ATM interface.

By Maureen Molloy
Senior Writer

SANTA MONICA, Calif. — Retix last week announced a RISC-based multiprotocol bridge/router that will be equipped with the industry's first Asynchronous Transfer Mode (ATM) interface, enabling it to forge high-speed links to private wide-area backbones as well as ATM-based workstations and hubs.

The ROUTERXchange (RX) 7000 is the vendor's new high-end bridge/router that consists of four Intel Corp. i960 Reduced Instruction Set Computing-based processor modules working in parallel to route multiple protocols as well as a separate RISC processor for path control and management.

Combined, the five processors have an aggregate packet forwarding speed of up to 200,000 packet/sec, a considerable step up from the 29,000 packet/sec speed of Retix's previous top-of-the-line 4000 series model.

"By designing the router with multiple processors and adding the RISC chip, Retix is enabling users to improve the performance of their interconnected LANs without requiring them to switch to a higher performance LAN topology, such as FDDI," said Jennifer Pigg, program manager for data communications at The Yankee Group in Boston.

The device will also support as many as four ATM interfaces at speeds up to 100M bit/sec, enabling it to link to multiplexers supporting users' private wide-area backbones as well as ATM-based workstations and hubs. The ATM interface, which will comply with standards put forth by the ATM Forum, will also have the ability to connect to public ATM-based services — such as Synchronous Optical Network — when they are offered by carriers, Retix said.

Leading the pack

Although a number of internetworking vendors have also announced plans to support ATM, most will not begin shipping such an interface until next year. Retix said it will have its ATM interface available by the third quarter of this year.

In addition to ATM, the new bridge/router can also support as

(continued on page 26)

ACC pack divides WAN bandwidth

By Maureen Molloy
Senior Writer

CUPERTINO, Calif. — Advanced Computer Communications (ACC) has announced it will enhance its routing software to improve user response times across wide-area network links.

As part of Release 5.0 software for its 4000 Series bridge/routers, ACC will implement a routing algorithm that will divide bandwidth equally among all users sending packets across WAN links.

Dividing the WAN bandwidth means batch-oriented traffic will not overrun other traffic, which should significantly improve response time for users running interactive applications.

"Interactive user sessions often get bogged down by network traffic, particularly when batch applications such as large file transfers are simultaneously vying for wide-area bandwidth," said Lionel Geretz, ACC's product marketing manager.

Most bridge/router vendors today let users prioritize traffic using manually configured filters. ACC's Express Queuing software goes a step beyond that by automatically dividing bandwidth evenly no matter what user sessions are sharing the wide-area link.

The algorithm accomplishes this by monitoring the source address and port identifier of each packet traversing the bridge/router. It then chooses to either transmit a packet or momentarily

(continued on page 25)

Now there's a comp as fertile as the mi

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> *Bob Kantor*
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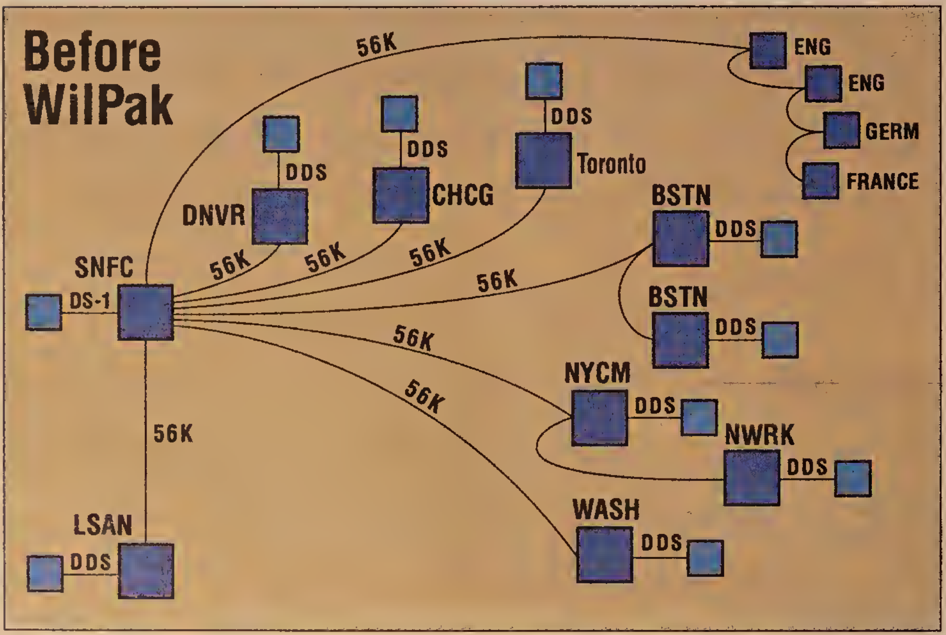

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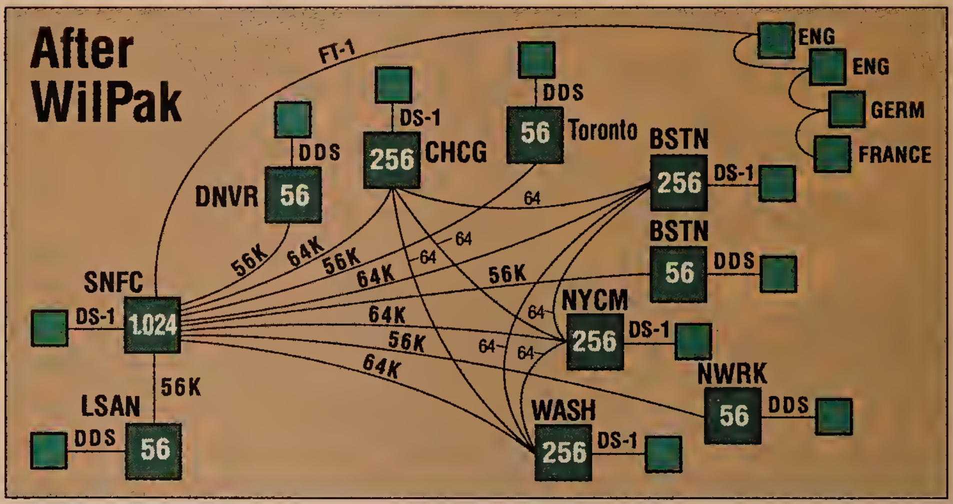

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NatSemi LERIC helps users achieve cost-effective remote net mgmt.

By Bob Brown
Senior Editor

SANTA CLARA, Calif. — National Semiconductor Corp. (NatSemi) has started shipping a new chip for departmental LANs that is designed to let vendors build wiring hubs and PC-based hub cards with scaled-down network management features.

NatSemi's new Lite Repeater Interface Controller (LERIC) is designed to help vendors address the growing need for basic, cost-effective net management at remote sites with departmental local-area networks.

The departmental LAN management capabilities are designed to complement users' full-featured enterprise LAN management systems, NatSemi officials said.

"We believe departmental LANs will go the management route," said Ed Roberts, director of communications for NatSemi's North American Business Center. "At some point, these users will want the confidence that their networks are connected at all times. It can be very expensive if they can't use the printer or something."

Intellicom, Inc., a Chatsworth, Calif., maker of personal computer-based hub cards — which turns PCs into wiring hubs — and NetWorth, Inc., a stand-alone hub manufacturer in Irving, Texas, were among the first vendors to build products using the LERIC chip. Intellicom used LERIC in its two six-port 10Base-T PC-based hub cards, dubbed the Tpair-426 and TPair-406. NetWorth designed a LERIC-based card for its Series 4000 wiring hub.

The LERIC chip is a scaled-down version of NatSemi's Repeater Interface Controller (RIC) chip designed for use in hubs and PC-based hub cards used in networks with as many as 200 nodes. The LERIC chips each support as many as six hub ports and can be cascaded together via an Inter-LERIC bus. They also feature an attachment unit interface port that supports connections to all 802.3 media, including 10Base-T, coaxial and 10Base-F fiber.

The LERIC chip features fewer management capabilities than the RIC chip so it can be packaged more cost-effectively for departmental LAN devices.

"Devices based on the LERIC chip are ideal if the customer doesn't have an [information systems] manager on site," Roberts said.

The LERIC chip supports the mandatory capabilities of the IEEE 802.3 repeater management draft standard, which could become an approved IEEE standard by year end, according to Richard Brand, strategic marketing manager for NatSemi's national LAN division and a voting member of IEEE 802.3, the standards group that oversees Ethernet.

> "Devices based on the LERIC chip are ideal if the customer doesn't have an IS manager on site."
>
> ▲▲▲

The basic features of the draft standard include notification of hub operation status, collision reporting and port partitioning, Brand said. The LERIC chip also offers LED support to indicate hub status and a port that can gather packet statistics via an attached microcontroller chip.

The LERIC chip does not incorporate the optional management capabilities of the 802.3 draft management standard. These include diagnostics and tracking of addresses for faulty nodes, Brand said.

The LERIC chip comes in two varieties — the DP83955 and the DP83956VL. The former is designed for hubs with as many as 24 ports formed by cascading four LERIC chips together. The latter offers the flexibility of an Inter-RIC bus, which lets vendors build devices using both LERIC and RIC chips to support a mix of departmental and enterprise LAN management capabilities.

The LERIC chips are shipping in sample quantities now and are scheduled to ship in volume in the third quarter. ◪

ACC pack divides WAN bandwidth

continued from page 21

retain it within the buffering queue in such a way that all user sessions obtain a fair share of the bandwidth.

This capability favors interactive data over batch-oriented traffic because the bandwidth reserved for interactive applications would more often be underutilized. Batch traffic will sustain greater delays when the amount of data flowing across the net exceeds the capacity of the wide-area link, but such applications can more easily tolerate delays without affecting performance.

"When using traditional filters, interactive sessions are the first to suffer when congestion occurs on the wide-area [link]," Geretz said. "With the new software, the router will now enable the network to behave in a way the user wants it to behave."

Art King, senior operating systems analyst at PacifiCorp in Portland, Ore., who is beta-testing the new software, concurred.

"I've had problems with batch jobs running on Sun workstations swamping the lines and hogging all the bandwidth, which resulted in very choppy and unacceptable response times for users running transactional applications," King said. "Since using the software, those users have seen significant improvements in response times without any perceivable slowdown for users running file transfers."

Express Queuing will be available this month free of charge to customers on ACC's software maintenance program. The software costs $1,000 for those not on the program. ◪

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Router supports ATM, RISC

continued from page 21

many as 12 X.25 or frame relay wide-area network interfaces at up to T-1 speeds, said Shelley Symonds, Retix's senior product manager.

The RX 7000 bridge/router has a 533M bit/sec backplane and can support as many as 12 Ethernet, token-ring and Fiber Distributed Data Interface local-area networks in any combination.

Protocol support

The product supports the Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, Novell, Inc.'s Internetwork Packet Exchange (IPX), as well as emerging Open Systems Interconnection protocols.

The RX 7000 also supports the Spanning Tree Algorithm for bridging, as well as the Open Shortest Path First and OSI's Intermediate System to Intermediate System routing protocols.

Retix said it will add support for Xerox Corp.'s Xerox Network Systems, Apple Computer, Inc.'s AppleTalk and IBM's Systems Network Architecture by early next year.

The bridge/router will also come equipped with hot-swappable interface modules so that failed cards can be replaced without disrupting other network operations.

It can be managed via Retix' 5025 Network Management Center or any Simple Network Management Protocol-based manager.

Diagnostic functions include bit error rate testing and loop-back tests — which have typically been available on products targeted solely for WAN applications.

The product is also equipped with dial-in/dial-out remote access for managing the device via dial-up links.

By next year, Retix said it will unveil an Integrated Services Digital Network terminal adapter interface for the RX 7000, as well as a redundant, load-sharing power supply.

The RX 7000 will be available in the third quarter and will be demonstrated at INTEROP 92 Spring this week. Pricing starts at $9,200. ◪

Cabletron pack cuts down traffic

continued from page 21

rently supports four of the 10 groups, including statistics, history, alarms and events but plans to support the entire range of Ethernet RMON MIBs by year end or early 1993.

The RMON support, which the company eventually plans to extend to token-ring and Fiber Distributed Data Interface environments, will give the hubs full monitoring and analysis capabilities, obviating the need for a stand-alone LAN analyzer at each remote site.

"It's good to see Cabletron incorporating more intelligence into the wiring hub," said Jim Odom, network manager at Harris Corp. in Melbourne, Fla., a user of competing hub equipment who was intrigued by the Cabletron announcement. "Putting more smarts into the routers, bridges and hubs is what it's all about. It's definitely the right direction to take."

Cabletron also filled a gap in its intelligent hub line with the introduction of the i960 Reduced Instruction Set Computing-based MRXI-24, a stand-alone, 24-port 10Base-T hub that is designed to provide advanced management capabilities for small work groups. The product provides users with a mid-range option between Cabletron's existing 12- and 48-port models.

Based on IEEE 802.3 standards, the MRXI-24 comes equipped with 24 RJ-45 ports and two user-configurable ports for attachment unit interfaces, uninterruptible power supplies, coaxial cables or fiber-optic cables. Also included are flash erasable programmable read-only memory, 4M bit/sec of CPU memory and the RMON support, with DLM software as an option.

The device can monitor between 20 and 30 devices, depending on factors such as disk usage.

The DLM feature will be available in 60 days and is priced at $495. The MRXI-24 costs $3,995 and will also be available in 60 days. Both products will be exhibited at INTEROP 92 Spring this week in Washington, D.C. ◪

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David Potter, CEO
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Worth Noting

Metropolitan Fiber Systems, Inc. has begun construction of a fiber bypass network in Atlanta. The 56-route-mile net will serve users in 61 buildings throughout the downtown, midtown, Buckhead and Perimeter Center areas when it is brought on-line this fall.

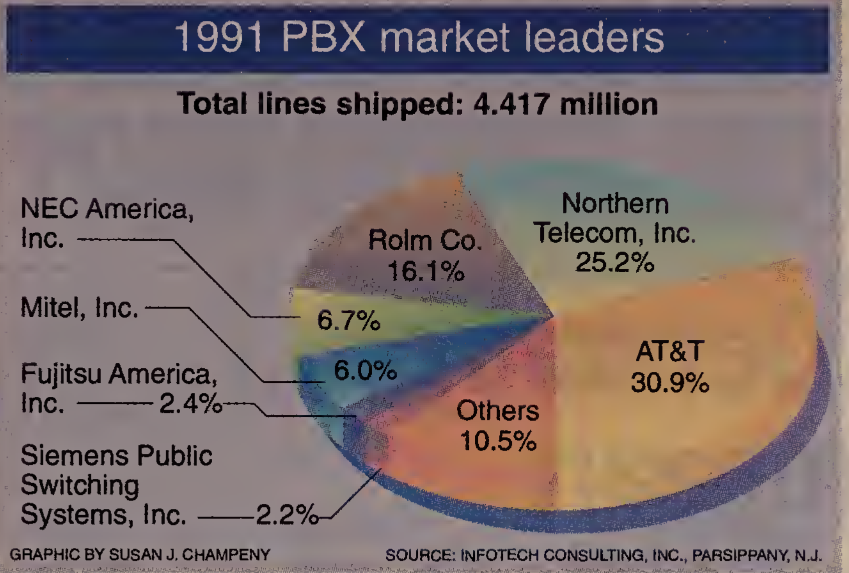
Regulatory Update

After almost three years of review, the **Federal Communications Commission** last week ruled that a remote access feature of AT&T's Software-Defined Network violated its orders banning AT&T from bundling 800 services with SDN. The feature in question, dubbed Network Remote Access (NRA) Option III-Express, allows customers to dial in to a predetermined on-network SDN location using an 800 number from an off-network site.

AT&T had claimed this was not a full-fledged 800 service but an access option. MCI Communications Corp., which filed an informal complaint concerning the offering in June 1989 and later filed a formal complaint, said the NRA Express was an 800 service, and, therefore, AT&T was illegally bundling it with SDN.

Although the FCC agreed that the feature violates its policies against bundling 800 and SDN, it did not award MCI the damages it had sought. MCI had claimed it was losing a substantial amount of business due to AT&T's tactics.

However, the FCC did tell AT&T that it could not allow users to keep their existing 800 numbers for use with the NRA Express feature. ◪


1991 PBX market leaders

Total lines shipped: 4.417 million

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: INFOTECH CONSULTING, INC., PARSIPPANY, N.J.

In a last-ditch Tariff 15 appeal, AT&T blasts FCC

Says the tariff has been under study since 1988.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — For the third time in as many years, AT&T is back before the Federal Communications Commission, attempting to save its Tariff 15 discount deals from extinction.

In a recent filing, AT&T blasted the FCC for its handling of Tariff 15, saying the agency has misinterpreted the language of the deals, avoided dealing with the main legal issues and confused the marketplace. "The commission has been 'investigating' [Tariff 15] virtually continuously since the tariff was first introduced" in 1988, AT&T complained.

AT&T filed documents attempting to show that a deal for Resorts Condominium International, Inc. (RCI) offering discounted 800 and Software-Defined Network service is legal. AT&T said Tariff 15 is nothing more than a self-defense mechanism the carrier has used to battle competitors trying to undercut its prices.

Tariff 15 has been at the center of controversy since it was introduced in 1988. It was ground breaking because, unlike traditional tariffs, it allowed AT&T to offer special discounts to specific customers if the carrier could convince the FCC it was matching similar offers from rivals.

Opponents of Tariff 15 claim the deals violate the Communications Act of 1934, which requires AT&T to offer comparable rates to similar customers and forbids discrimination on the basis of rates, terms or conditions.

Last August, after investigating the RCI deal for two years, the FCC rejected the discount package as unlawful. Although the order technically only applied to RCI, it paved the way for the agency to reject almost 20 more Tariff 15 deals on file.

The FCC ruled that the RCI plan was unlawful because, like all Tariff 15 deals, it only matched and did not beat rival deals, an action the FCC deemed anticompetitive. The agency did not address the question of whether AT&T is ever justified in making an off-tariff deal in response to a competitor's offer.

Undaunted by that decision, AT&T took the FCC to court in October. In December, the U.S. Court of Appeals for the District of Columbia issued a stay preventing the FCC from forcing AT&T to withdraw the RCI deal, prompting the commission to voluntarily review the matter. AT&T had to withdraw its first Tariff 15 deal for Holiday Corp. because the FCC ruled in 1989 that the deal was unlawful.

Earlier this month, AT&T criti-

(continued on page 28)

> Opponents claim the deals violate the Communications Act of 1934.
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RBHCs share SMDS, frame relay plans

BellSouth, Ameritech to deploy services this year; customer demand to determine additional sites.

By Bob Wallace
Senior Editor

BellSouth Corp. and Ameritech last week announced plans to deploy a public frame relay service and a Switched Multimegabit Data Service (SMDS).

BellSouth will roll out the two services in four cities by year end, while Ameritech will deploy the advanced data services in two cities in the fourth quarter of this year.

BellSouth will make the services available initially in Atlanta, Miami, Nashville and Charlotte, N.C., as part of a controlled introduction and possibly extend them to 30 other cities next year.

The services will provide users with high-speed alternatives to dedicated facilities for supporting bandwidth-intensive applications such as local-area network interconnection, imaging and videoconferencing.

"We see SMDS and frame relay as being complementary — not competing — services," said Rob Capell, an assistant vice-president at BellSouth. "SMDS is best suited for higher speed applications, while frame relay will be used by customers with lesser bandwidth needs."

All seven regional Bell holding companies, GTE Telephone Co. and two independents — Cincinnati Bell, Inc. and Southern New England Telephone Co. — plan to jointly announce support for frame relay at a press conference held simultaneously at INTEROP 92 Spring in Washington, D.C. and the International Communications Association's annual conference in Atlanta ("Bell Atlantic to offer frame relay alongside SMDS," *NW,* May 11).

BellSouth's strategy

BellSouth will use a single switching platform — AT&T Network Systems' Broadband Networking Switch (BNS)-2000 cell relay switch — to support both services but may not stay with the switch for the long haul. "The BNS-2000 meets our short-term

(continued on page 29)

BT unit's EDI service lets schools swap transcripts

By Bob Wallace
Senior Editor

SAN JOSE, Calif. — BT North America, Inc. last week announced a package of software and services that enables electronic transmission of academic transcripts.

The electronic data interchange offering should enable institutions to decrease records and administration costs while enhancing student services. It will also let students opt to transfer transcripts to other schools using the service in a matter of minutes instead of days.

The package consists of BT North America's EDI*Net service and EDI*Smart software developed by Information Associates, Inc., a Dun and Bradstreet Software unit in Rochester, N.Y. "This is an exciting new market with tremendous potential that has yet to be tapped," said Mark Baker, BT North America's president and chief executive officer.

The two firms will market the package to the country's 3,600 colleges and universities as well as its 83,000 elementary and secondary schools as part of a three-year sales and marketing arrangement. BT North America said it is also discussing the package with academic institutions in other countries.

According to the firm, the service will enable schools to halve the cost of sending and receiving student transcripts. Higher education institutions combined send and receive as many as 30 million transcripts annually. The cost of processing a single transcript using traditional methods costs an about $9, while the EDI package could cut the price to be-

(continued on page 29)

AT&T opens National ISDN Center to improve service

By Bob Wallace
Senior Editor

BASKING RIDGE, N.J. — AT&T last week said it will open a National Integrated Services Digital Network Center in Atlanta to respond to growing demand for its Primary Rate Interface (PRI) offering and improve customer service.

The center, which will be responsible for all provisioning, protocol testing and maintenance functions for customers using ISDN PRI access, will be staffed by managers and technicians dedicated to the carrier's ISDN-related offerings.

They include INFO-2, AT&T's automatic number identification feature and Call-By-Call Service Selection, which enables companies to use a single PRI to access multiple net services on a call-by-call basis.

The center will also employ managers and technicians for each type of service that can be accessed using PRI, such as Accunet Switched Digital Services and AT&T's Software-Defined Network service, its virtual net offering.

Committed to ISDN

In 1988, AT&T became the first interexchange carrier to roll out ISDN PRI service. PRI enables users to configure a single T-1 pipe to support 23 64K bit/sec channels for voice or data communications and a single 64K bit/sec channel for signaling.

Richard Campbell, AT&T's ISDN product manager, said creation of the center demonstrates the carrier's commitment to ISDN. With specially trained and dedicated personnel, the center is designed to enhance trouble isolation and detection, improve testing standards and accelerate introduction of new features, he added.

"ISDN customers want to know that the people taking their order and doing their provisioning and maintenance all work side by side and are knowledgeable about their needs," Campbell said.

AT&T said it is the first long-distance carrier to establish a single net center dedicated to ISDN service. According to the carrier, it has 267 ISDN PRI customers. ◪

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AT&T blasts FCC in tariff appeal

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cized the FCC decision that rejected the RCI deal. "That [order] was wrong as a matter of law, was unsustainable as a matter of fact and was otherwise erroneous," AT&T said.

AT&T said a long string of court rulings, reports from the Department of Justice and even previous FCC decisions support the carrier's right to offer special deals to match the competition. AT&T claims that rather than inhibiting competition, Tariff 15 deals have helped drive competition.

In addition to offering evidence to support Tariff 15 generally, AT&T also tried to shore up support for unique provisions of the RCI deal. That offering bundled 800 and SDN services into a discounted package, something the FCC had rejected as unlawful under a more general AT&T tariff and forbidden under Tariff 12 until recently.

In April, the FCC reversed a 1991 decision and allowed AT&T to bundle 800 offerings with other services as long as customers agreed to change their 800 numbers prior to signing up for the new deal.

The reasoning was that AT&T is dominant in the 800 market and since customers cannot switch to another carrier and keep their 800 number, AT&T might have undue market power.

AT&T argued in its filing that Tariff 15 allows it to do things to respond to competitors' offerings that might not otherwise be allowed. Therefore, such bundling concerns are irrelevant.

However, if the FCC decides to apply the same rules to Tariff 15 that it did to Tariff 12, AT&T requested that the agency grandfather existing Tariff 15 customers and compel the 800-number change only for new users. ◪

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RBHCs share SMDS, frame relay plans

continued from page 27

needs, but we'll continue to evaluate it and other platforms for future broadband services for use in the 1993 to 1995 time frame," Capell said.

Meanwhile, the BNS-2000s — one in each of the four cities — will be the workhorses for both services, which are expected to become available later this year.

BellSouth's public frame relay services will support 56K bit/sec, fractional T-1 and T-1 port access speeds. The company plans to add higher port access speeds but declined to give a date.

Frame relay is an emerging interface standard for high-speed packet-switching technology, which speeds packet processing by only performing error correction at end nodes instead of at each switch in a frame relay net.

According to the carrier, it will either refer customers to vendors making customer premises equipment that conforms to the frame relay standard or comarket the products with vendors that would be responsible for installing and supporting the equipment.

Pricing for the services is still being determined, but BellSouth expects to submit a tariff for each service to state regulators in Florida, Georgia, North Carolina and Tennessee in late summer, Capell said.

BellSouth plans to skip field trials and move into controlled introduction. "We'll evaluate the service in early 1993," Capell said. "If our customers are happy with the service, we'll [deploy] it in the additional 30 [cities]."

The decision to offer SMDS was based largely on experience gleaned from internal trials that began in 1989 and involved use of SMDS to link LANs in its Atlanta, Nashville and Birmingham, Ala., offices.

SMDS will be offered in various access classes ranging from 1.1M to 34M bit/sec, Capell said. SMDS is a switched high-speed digital data service capable of supporting transmission speeds between roughly 1M and 155M bit/sec.

As will be the case with its frame relay service, the RBHC will refer users to vendors that make SMDS-compliant customer premises equipment or comarket the equipment with the vendors. The carrier said it is discussing the possibility of field trialing SMDS links with two interexchange carriers but declined to name them.

Capell predicts that the top two applications for SMDS will be LAN interconnection and imaging. Government and manufacturers will likely be the heaviest LAN interconnection users, while health care and financial services firms will likely be the biggest imaging users.

Ameritech's plans

Ameritech also sees customer demand for these and other applications. It will file tariffs for frame relay and SMDS in the end of the third quarter or the beginning of the fourth.

It will initially offer the services in Chicago and Detroit, and add Cleveland, Columbus, Ohio, Indianapolis and Milwaukee in the first half of 1993, a spokesman said. Beyond that, frame relay and SMDS will be deployed based-on customer demand.

Both services will be provided from AT&T BNS-2000 cell relay switches as part of a multicustomer field trial that includes Blue Cross and Blue Shield of Michigan, Ford Motor Co. and Merit, Inc.

The test will conclude in the third quarter. An Ameritech spokesman declined to say if the AT&T switch will be used to support the services once the trial has concluded.

Ameritech's frame relay port access speeds supported in the trial will range from 56K bit/sec to T-1, while access classes for SMDS will range from 1.2M to 34M bit/sec. ◘

EDI service swaps school transcripts

continued from page 27

tween $2 and $5, BT North America said.

San Jose State University is among the first to use the package for exchanging transcripts with area colleges. More than 50% of its transfer students come from 10 local colleges, which accounts for most of the 120,000 transcripts the school handles annually.

"We expect to save significant monies implementing this [technology] with the goal of increasing student services and staying competitive with other schools," said Ed Chambers, associate executive vice-president of admissions and records at San Jose State.

The EDI*Smart software costs $10,000, which includes transcript management, an EDI*Net connection and an EDI*Net mailbox. Other costs include network usage fees and an annual $1,200 fee. The two companies will waive the $10,000 fee for any member of the American Association of Collegiate Registrars and Admissions Officers that sign up for the offering. ◘

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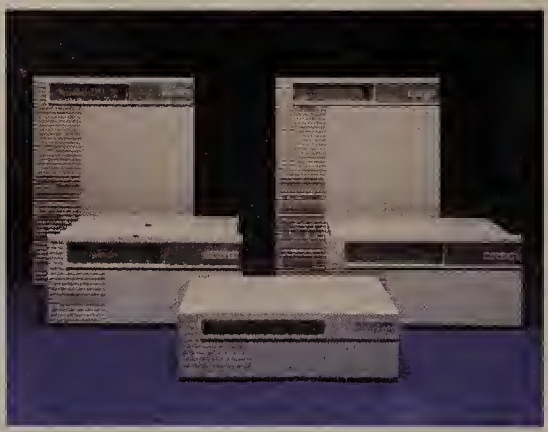

Most router vendors give you two ways to deal with network growth, neither very appealing. Either spend big bucks on a new router, or stay with what you have and learn to live with progressively slower performance. Wellfleet, on the other hand, lets you expand your networks without degrading performance simply by adding processor modules to your existing routers. That's the kind of flexibility inherent in our advanced symmetric multiprocessor architecture. For a Wellfleet Architecture Report, please phone **1-800-448-3400, ext. 478W.** It will explain everything.

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Circle Reader Service #134

ENTERPRISE APPLICATIONS

CLIENT/SERVER AND ENABLING SOFTWARE: DISTRIBUTED DATABASE, MESSAGING, GROUPWARE AND IMAGING

Worth Noting

> "No vendor provides a complete platform to support the creation of distributed, object-oriented applications — not IBM, not Digital, not Novell, nobody."
>
> **John Rymer**
> Vice-president
> Patricia Seybold's
> Office Computing Group
> Boston

Store & Forward

Micro Decisionware, Inc. has announced a new release of its database gateway for IBM's DB2 that provides better performance for LAN-to-mainframe data transfer and support for new features found in Microsoft Corp.'s SQL Server Version 4.2.

The gateway consists of two components — the Database Gateway for DB2 Release 2.0, which runs on a local-area network, and DB2-CICS Access Server Release 1.4, which runs on the mainframe. These components enable LAN databases to access IBM's DB2.

The performance gains in the new version are achieved with data compression, which allows more data to be transferred over the communications line.

In addition, the new version supports multiple host transaction identifications, enabling the Access Server to support different types of processing requirements. It also boasts a temporary storage management feature, providing a way to bypass host-based temporary storage in order to return data to the client.

The new release will be available in July and will be provided to existing customers under maintenance contract agreements.

(continued on page 34)

X.400 Lite provides aid to LAN users

By Timothy O'Brien
West Coast Bureau Chief

LOS ANGELES — With the introduction of a new LAN-based product called X.400 Lite, start-up International Standards Open Communications Resources (ISOCOR) is hoping to make it easier and less expensive for users to implement X.400 messaging on local-area networks.

X.400 Lite allows LAN users to send messages asynchronously over dial-up lines instead of over more expensive communications links. The company maintains that the product can be installed in less than one hour, compared to more than a day for other X.400 systems.

Designed to work with documents generated by almost any personal computer application, X.400 Lite is an international X.400 standards-compliant messaging system that utilizes a set of rules-based address management and routing features.

The product includes software for client workstations and code for a PC acting as an X.400 Lite communications server. The client software works with Microsoft Corp.'s Windows to give users the ability to transfer files from applications such as electronic mail, facsimile and electronic data interchange.

Linking X.400 Lite servers to ISOCOR's larger X.400 Isoplex 400 and 800 server models can provide smaller departments or remote offices with access to a corporate X.400 backbone.

These Isoplex 400 and 800 servers, acting as hubs for the network messaging traffic, run on both DOS and Reduced Instruction Set Computing platforms and support the transfer of documents over X.25 links or Ethernet using either Open Systems Interconnection or the Transmission Control Protocol/Internet Protocol.

"For LANs, X.400 has just been too difficult and expensive to use. But X.400 Lite can make document transfer technology more available to the desktop user," said David Knight, associate vice-president of marketing and sales at ISOCOR.

X.400 Lite is compatible with X.400 products from Digital Equipment Corp., Hewlett-Packard Co., IBM and NCR Corp., as well as AT&T's Mail 400, MCI

(continued on page 34)

Magic offers application developers new options

By Timothy O'Brien
West Coast Bureau Chief

IRVINE, Calif. — Magic Software Enterprises, Inc. has announced a new version of its client/server application development environment that supports Microsoft Corp.'s Windows and new computing and network platforms, as well as links to new database servers.

Magic is a set of tools that allow developers to design, prototype, test and modify applications without programming. The product includes client-based development tools and runtime software, as well as server code that provides links to a number of database servers.

Formerly available only on DOS, Magic 5.0 is now also available on Digital Equipment Corp.'s VAX/VMS and various Unix platforms. Applications developed using Magic can interoperate across or be ported to any of these systems.

Beyond supporting Novell, Inc.'s Btrieve file manager, Version 5.0 now supports Oracle Corp.'s Oracle Server, Microsoft and Sybase, Inc.'s SQL Server, The ASK Companies' Ingres Intelligent Database and others.

While the previous version worked with Novell's NetWare, Magic 5.0 also works with Microsoft's LAN Manager. Additional protocols supported include DEC's DECNet and the Transmission Control Protocol/Internet Protocol.

New approach

The application development environment utilizes a new Windows-based menu and table-driven visual approach that lets developers see on their screens in a single process how the application will eventually look. Applications are created in Magic by de-

(continued on page 34)

Migration strategies

Approaches some companies are taking to move from host-based systems to open, distributed computing platforms.

Build:	**Kash n' Karry Food Stores**	Construct an entirely new distributed computing system based on advanced object-oriented technology.
Buy:	**Motorola, Inc.**	Replace mainframe hardware and software with a distributed network of Unix processors and off-the-shelf software.
Modify:	**Glendale Community College**	Keep host processor as a file server on the network and gradually downsize applications onto Unix servers using fourth-generation language tools.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: *NETWORK WORLD*

On diverse paths to distributed systems

Users are taking a variety of approaches in move to open, distributed computing environments.

By Wayne Eckerson
Senior Editor

While many users are attempting to move from rigid host-based computing platforms to open, distributed processing environments, the strategies they have adopted range from aggressive to evolutionary.

The most adventurous users have opted to start from scratch and build entirely new computing systems based on advanced, object-oriented distributed computing technologies. Other aggressive companies have decided to replace their host-based software with off-the-shelf applications running across distributed networks of Unix processors.

More conservative firms are maintaining hosts as large file servers and gradually downsizing applications onto Unix servers.

These three strategies — build, buy or modify — were enunciated by users from the Tampa, Fla.-based grocery chain Kash n' Karry Food Stores, Motorola, Inc. and Glendale Community College in Glendale, Calif., at the Fourth Annual Executive UniForum Symposium in Santa Barbara, Calif.

Object-reoriented

According to James Stikeleather, director of development at Kash n' Karry, the grocery chain is pioneering new territory and spending big bucks annually — as much as it costs to build one new store each year — to completely recast its information systems (IS) using object-oriented technology.

The chain, which owns 112 stores in Florida, is building an object-oriented cooperative processing environment supported by Sun Microsystems, Inc. workstations, Stikeleather said. The network promises to provide executives and managers greater flexibility in accessing mission-critical data than the firm's host-based system.

The objects, representing software code and data, reside in an object manager, which is a layer of software that sits on top of a relational database on the workstations. The objects interact with one another in real time to record and present information in response to user queries.

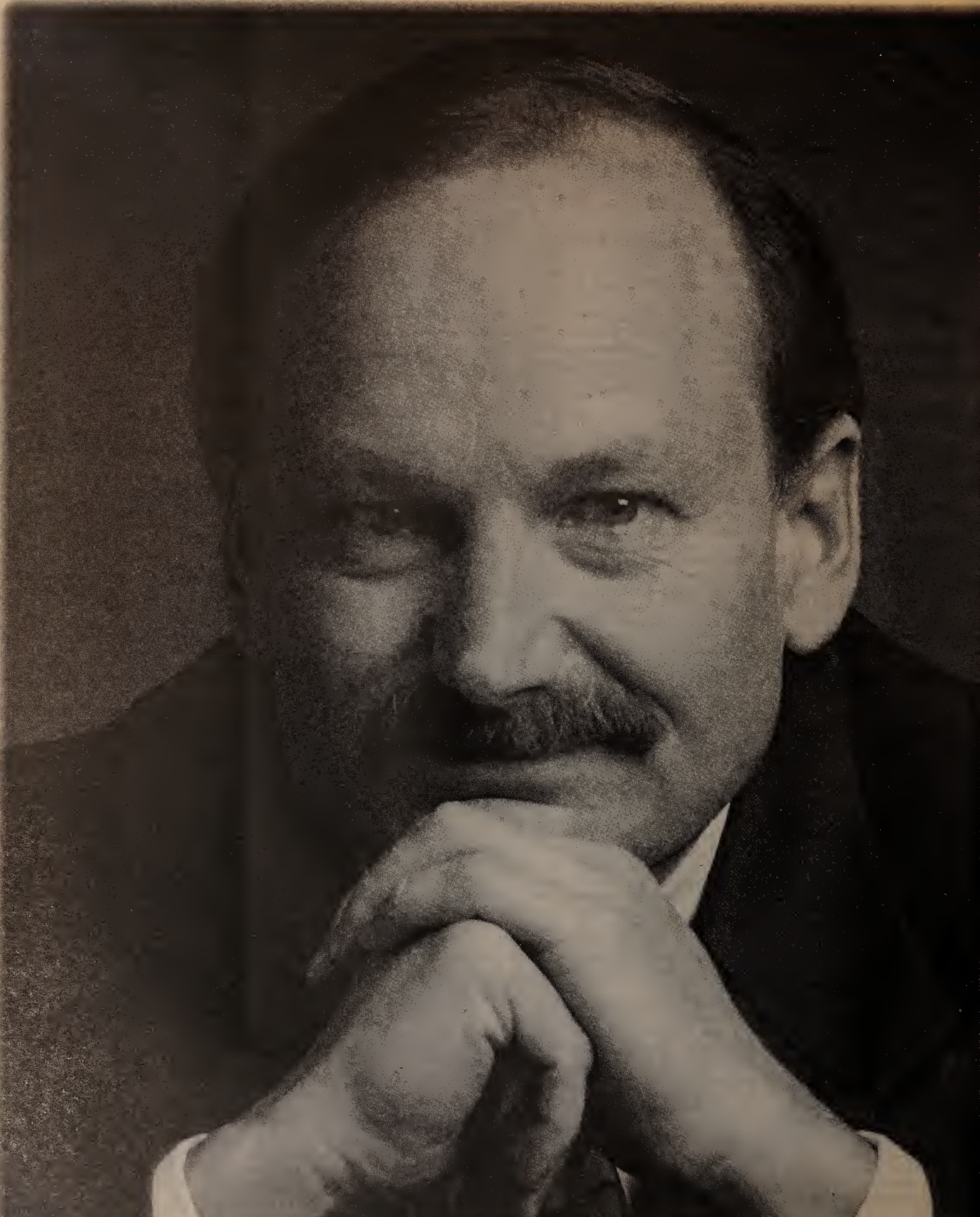
Kash n' Karry has found few vendors capable of providing the technology or expertise to build the new distributed system. Consequently, the firm has had to develop most of its own object-oriented tools, including a programming language, an object manager database and a user interface to objects.

In its search for technology, the company has even incorporated capabilities found in flight simulators. According to Stikeleather, the firm is spending as much on research and development of object-oriented distributed computing as some major computer vendors.

"Our executives are deeply committed to this project because they view access to information as the key to competing successfully in business," he said.

While the risks and initial

(continued on page 35)



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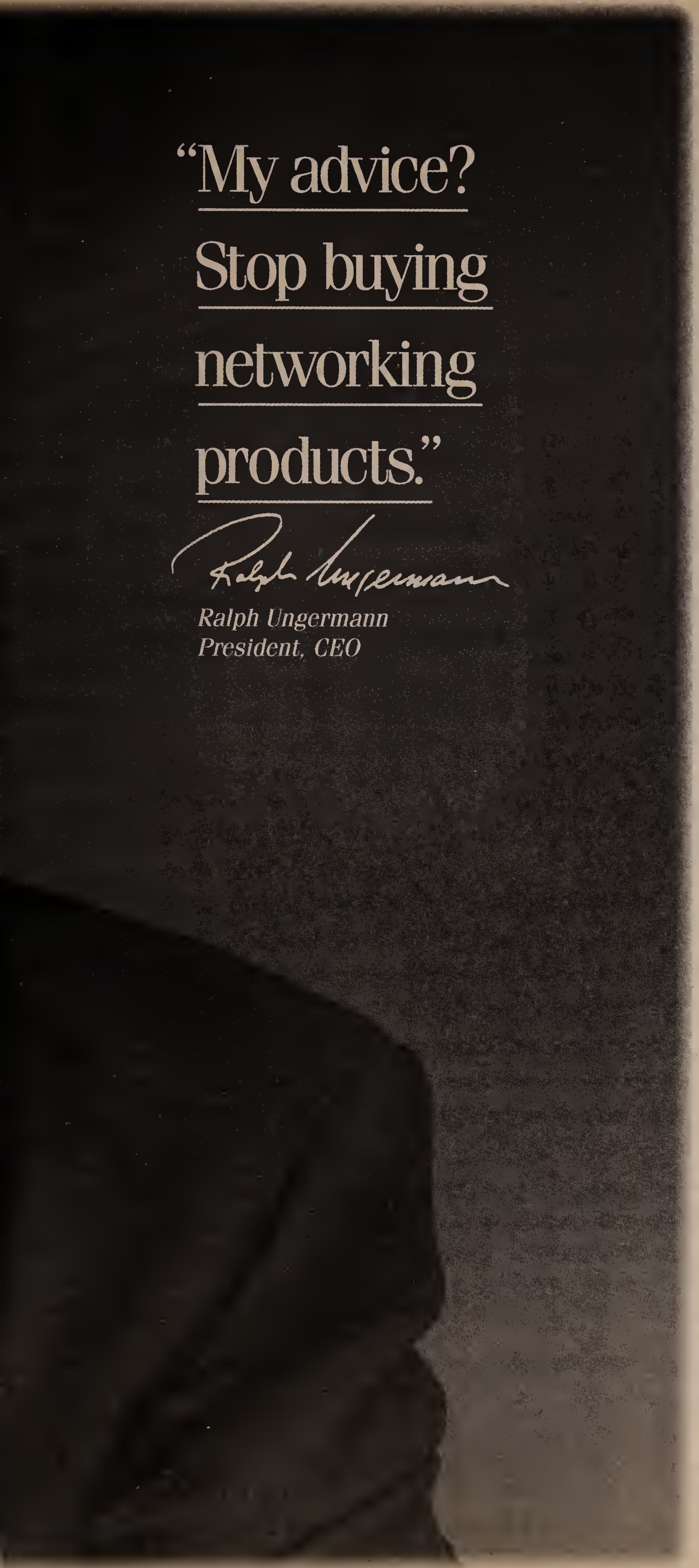

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Every week somebody introduces a hot new networking product. But the IT managers I talk with say that what's really important is not the latest box, but leveraging their investment for increased productivity and competitive advantage. Businesses everywhere are under enormous pressure to compete more effectively in the global marketplace. Open enterprise networks can be of great value in meeting these goals.

It's no wonder that IT executives have become a lot more interested in finding a network partner than in buying the latest hot products. The focus now is on getting the most out of installed systems, teaching people how to leverage technology for productivity gains and bringing new business applications on line — ahead of the competition.

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Magic offers new options

continued from page 31

scribing their functionality rather than writing code, which saves developers time and effort.

"With this new version, we are providing client/server tools that allow users to build applications that run without modification on multiple platforms and access database servers already in place," said Miko Hassan, Magic's vice-president of technology.

> Changes made to any part of the application are automatically updated throughout that application.

▲▲▲

Step saver

Magic allows developers to create applications on one platform and immediately run them on other platforms without any modifications or recompilation of code.

In addition, the application is stored in a library that is based on Magic's relational architecture. Therefore, changes made to any part of the application are automatically updated throughout that application.

Magic Software Enterprises is a subsidiary of Magic Software Enterprises, Ltd., based in Tel Aviv, Israel. The company has distributed more than 100,000 Magic licenses in 17 languages and 25 countries around the world but has only just begun to penetrate the U.S. market.

Some major companies using Magic include Union Carbide Corp., Wells Fargo & Co., Texas Instruments, Inc. and Deloitte & Touche.

Magic 5.0 is available now. A stand-alone DOS development license costs $800, while a local-area network development license is priced at $1,500. Other prices vary depending on platform, configuration and support. ◘

Store & Forward

continued from page 31

For more information, contact Micro Decisionware at (303) 443-2706.

Alisa Systems, Inc. announced a new release of AlisaMail, its Digital Equipment Corp. VAX-based messaging system that supports leading local-area network-based electronic mail systems.

With 4.0, AlisaMail has added support for personal computer-based E-mail systems from Da Vinci Systems Corp., Lotus Development Corp. and Microsoft Corp. as well as Novell, Inc.'s Message Handling Service (MHS). In addition, AlisaMail now supports DEC's Message Router gateway.

By supporting LAN based E-mail systems in the new release, AlisaMail provides a way to link these systems to E-mail offerings based on Apple Computer, Inc. Macintosh computers.

AlisaMail consists of a set of programs and services centered around a VAX-based SQL database program called Information Switch, which handles the transfer of messages between disparate E-mail systems.

AlisaMail Version 4.0 will be available in May. Pricing is based on system configuration, with an entry-level system beginning at $10,000. For more information, contact Alisa Systems at (818) 792-9474.

Suite Software has introduced SuiteDome, a distributed application development environment that includes message, name and security services, as well as a distributed data dictionary and object repository.

SuiteDome will enable developers to build applications that run on a single computer or across a network of workstations using different protocols and running different databases.

Protocols supported include Digital Equipment Corp.'s DECnet and the Transmission Control Protocol/Internet Protocol. Additional protocol support will be included this year.

The price of the development software is $450 per user. SuiteDome currently supports Digital Equipment Corp.'s VAX/VMS and various Unix workstations. Support for DOS and OS/2 is under development.

For more information, call Suite Software at (619) 698-7550. ◘

X.400 Lite aids LAN users

continued from page 31

Communications Corp.'s MCI Mail XChange 400 and Sprint Corp.'s SprintMail 400.

It can work with Novell, Inc.'s NetWare, Banyan Systems, Inc.'s VINES, Microsoft's LAN Manager and IBM's LAN Server on most networks and wiring schemes.

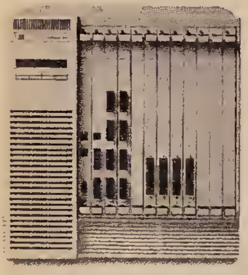
Virtually any Hayes Microsystems, Inc.-compatible asynchronous modem can be used with X.400 Lite.

Included in the new product is a set of tools called ISOMAIL 400 that support the development of document transfer applications from both DOS and Microsoft Windows environments.

These new applications will have access to EDI and E-mail packages through the use of X.400 Lite Access Units developed by either ISOCOR or third parties. ISOCOR is in the process of developing interfaces to X.400 for the popular E-mail formats. The first interface, known as ISOGATE 400, is for Novell's Message Handling Service (MHS).

X.400 Lite is available now. It is sold as a single package with both client and server software for $2,450. ◘

Distributing bandwidth on the netw



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And should you want to connect your most bandwidth-hungry users directly to FDDI—you can configure up to 42 fiber connections.

On paths to distributed systems

continued from page 31

learning curve are significant, Stikeleather is confident there will be a considerable payoff.

He said object-oriented distributed computing will obsolete such things as computer-aided software engineering (CASE) tools and transaction processing monitors, and significantly speed up application development time.

"We adhere to the philosophy that you should nuke your existing systems," Stikeleather said. "We believe we can build new systems faster than we can ever migrate our legacy systems."

Cash-and-carry software

Not all net executives would prescribe Kash n' Karry's radical departure from traditional computing methods. But today's globally competitive environment is pushing many network executives to seek alternatives to centralized mainframe processing.

Facing intense global competition, Motorola, a maker of radio communications equipment, is accelerating product life cycles, introducing new products every year or two and enhancements every six weeks.

To keep up with the pace of its core business, Motorola's IS department decided to scrap its IBM mainframe applications — which typically take two to four years to develop — and replace them with off-the-shelf Unix software running on Motorola-built processors connected via an Ethernet network.

"We have made a commitment to avoid purchasing or developing proprietary software because our business moves too fast to justify the investment in time or money," said William Connor, director of information technology at Motorola's General Systems Sector in Tempe, Ariz. "While proprietary software is often more robust, it typically brings short-term profit and long-term pain."

This strategy has cut Motorola's application development time by one-third and its IS costs in half, saving the firm $40 million a year, Connor said.

Motorola now works closely with smaller firms that are developing Unix applications for commercial use. To safeguard its investment in products from these small firms, Motorola often puts their software code in escrow.

While Motorola must spend a lot of money to train end users to utilize the new Unix applications, Connor said there are plenty of advantages.

The vendors provide higher quality software with fewer bugs and better training, support and documentation than internal development staffs, he said. Also, as a major client of some of the small Unix developers, Motorola has the opportunity to influence the development of initial software releases and enhancements.

> "We adhere to the philosophy that you should nuke your existing systems," Stikeleather said. "We believe we can build new systems faster than we can ever migrate our legacy systems."
>
> ▲▲▲

When it wants to modify or beef up parts of an off-the-shelf Unix application, Motorola uses a CASE tool from FourGen in Edmunds, Wash. But in general, Motorola tries to leave the original Unix code intact.

If no suitable Unix application exists or end-user training costs are prohibitive, Motorola will develop the Unix application internally using a CASE tool, Connor explained.

One step at a time

Glendale is moving gradually to distributed computing. The community college has a five-year plan for migrating its Digital Equipment Corp. VAX VMS applications to Unix.

The school currently has a VAX cluster that supports such applications as student records, financial aid and human resources. Many of these applications will be rewritten for Unix by a consortium of IS managers representing 71 California community colleges. The group plans to distribute the Unix applications to participating members in three to five years.

By consolidating development efforts and using common software, the consortium expects to save the schools and California taxpayers considerable money, according to Richard Contreras, director of data processing and telecommunications at Glendale.

To support the Unix applications, Glendale plans to convert some of its VAX processors to run Ultrix, DEC's version of Unix. These processors will be linked on Ethernets running DECnet. The Ethernet nets will be bridged to Novell, Inc. NetWare local-area networks supporting user terminals and personal computers.

Glendale is currently using Cognos, Inc.'s Powerhouse fourth-generation language to write new VMS applications for the VAX cluster.

Eventually, Glendale will convert some of these VMS applications to Unix using a version of Powerhouse that recompiles VMS code for Unix machines, Contreras said.

The college is also rewriting some of its older COBOL programs using Powerhouse so they can later be converted to Unix. ◘

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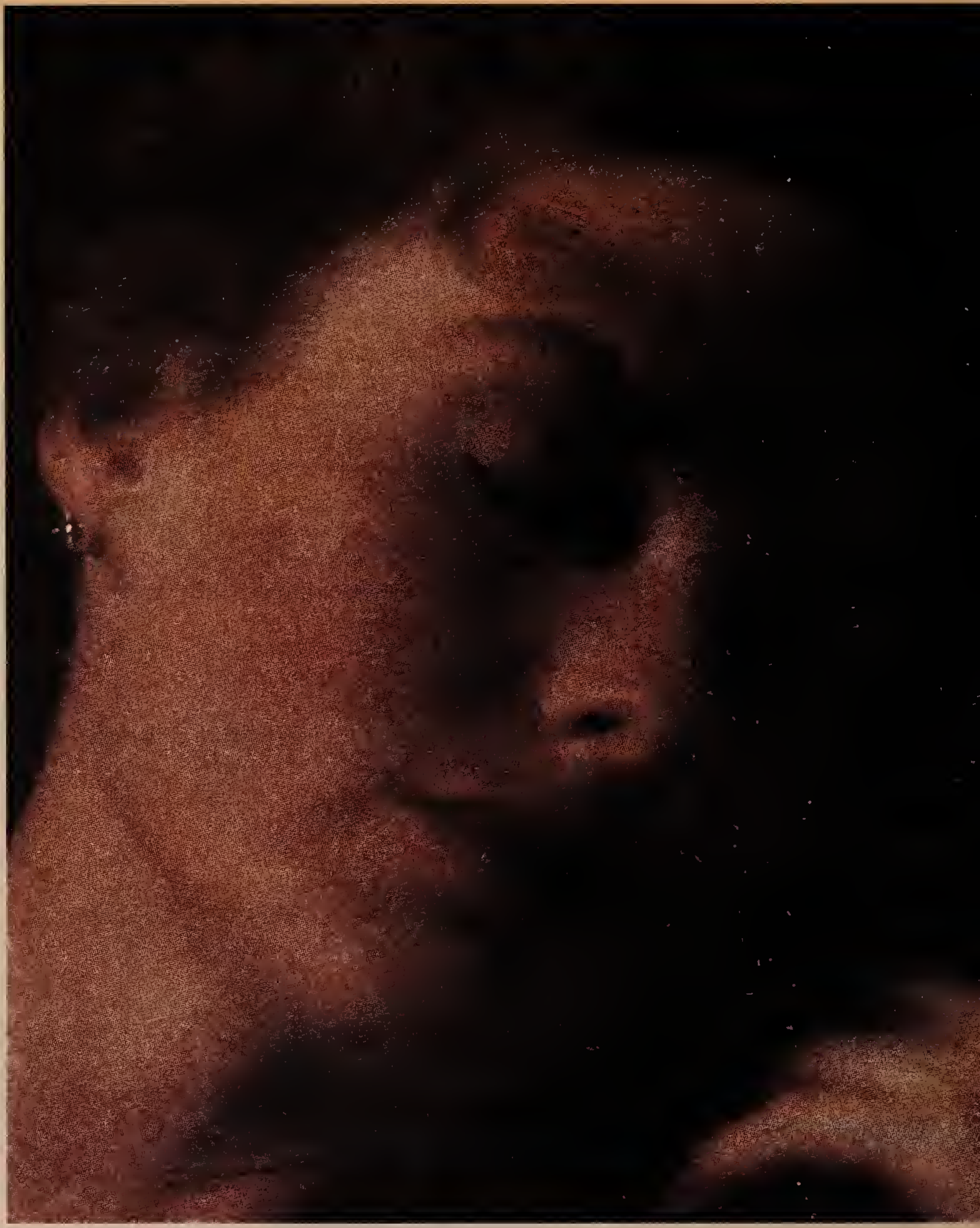

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Our own customers began doing just that in 1985, when our first Ethernet silicon helped foster the widespread acceptance of LANs. Since then, more award-winning Ethernet adapter cards have been created and certified with National's silicon than any other. What's more, our newest solutions are already fueling the emergence of "network ready" Apple and IBM-compatible PCs and peripherals.

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customers to seamlessly connect Ethernet and Token-Ring protocols. And we recently introduced our single-chip TROPIC™, the industry's first fully-integrated Token-Ring controller. That's just the initial step in a joint IBM-National relationship expected to deliver new levels of flexibility to you and your customers.

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS, ALLIANCES AND FINANCIALS

Worth Noting

PictureTel Corp., a Danvers, Mass., maker of videoconferencing systems, stated in its 1991 annual report that its research and development spending rose 89.3% to $10.2 million last year from $5.4 million in 1990. Those expenses decreased as a percentage of revenues, however, to 13% in 1991 from 14.5% in 1990.

People & Positions

Kendall Jones has been promoted to director of software engineering at **Concord Communications, Inc.**, a Marlborough, Mass., maker of network protocol analyzer software and hardware. He will be responsible for product planning and development.

Previously, Jones was manager of software development at the company.

Cable & Wireless Communications, Inc. has recently named **George Vinall** as director of government affairs. He will be responsible for federal legislative and regulatory affairs programs at the firm.

Douglass Ebstyne, formerly vice-president of sales and marketing at Digital Systems International, Inc., has joined **Davox Corp.** as senior vice-president of marketing and sales. He will be responsible for developing and managing Davox's corporate strategies and marketing programs as well as direct sales activities. ◼

DEC users remain upbeat despite firm's financials

Future depends on networking, vendor alliances.

By Jim Duffy
Senior Editor

BOSTON — Users of Digital Equipment Corp. networking gear are confident the company can rebound from its current financial slump and regain momentum by focusing on networking and alliances with other vendors.

DEC, citing the sluggish economy and other factors, was rocked by a loss of nearly $300 million in the third quarter of fiscal 1992, which ended March 31. DEC has cut its work force by 4,900 in the nine-month period from July 1, 1991 to March 31.

DEC said it will also take a charge this quarter to finance staff cuts in fiscal 1993. Published reports say the charge will be as much as $1 billion this quarter to cover the cost of slashing another 10,000 to 15,000 employees from its payroll in fiscal 1993. A DEC spokeswoman would not confirm those numbers.

DEC's fiscal year runs from July 1 to June 30. Analysts expect the losses to continue for at least the first two quarters of fiscal 1993 as DEC looks to rein in expenses.

Kenneth Olsen, DEC's president and founder, has come under fire from analysts and other company watchers for being out of touch with his company.

But as DECworld '92 came to a close here last week, customers remained steadfast in their belief that DEC can weather this latest storm, regroup and continue to supply innovative products and services.

"We still depend on a great deal of technology from DEC," said Jim White, a network consultant for E.I. du Pont de Nemours & Co. of Wilmington, Del. "We expect it to keep coming."

Forging alliances

White added that DEC was positioned "as well as any company" to provide open systems and networking products, a direction he said is critical to the company's future. But key to that success will be DEC's ability to manage and benefit from alliances with other companies, such as its partnership with Microsoft Corp.

DEC and Microsoft are working together to tightly couple Microsoft's Windows desktop environment with DEC's enterprise-wide networks. Key to that endeavor is enabling each company's strategic products — Microsoft's Windows NT operating system and DEC's Reduced Instruction Set Computing-based Alpha workstations — to interoperate ("Microsoft, DEC to align architectures," *NW,* April 27).

(continued on page 38)

INDUSTRY BRIEFS

Government computer spending to rise slightly. Federal government spending for information technology products and services will grow about 3% in fiscal 1993, according to a recent study by Federal Sources, Inc., a McLean, Va., consulting firm. Fiscal 1993 spending will total $24.2 billion, up from $23.4 billion in fiscal 1992.

Most of the increase in spending will come from civilian agencies, where spending will rise 5% in the next fiscal year. Department of Defense spending on information technology will remain flat, which is impressive given that the rest of the Defense Department budget is in decline, said Robert Dornan, vice-president at Federal Sources.

"While these figures appear to be rather bleak on the surface, there are a number of big contracts coming up for award in the period," Dornan said. "There are at least 85 major awards of more than $25 million each projected for fiscal year '93."

(continued on page 42)

"One of the most important things I see is putting an end to what I call the protocol wars. [I suggest we] think of the evolution of the Internet as something independent of the protocol suite."

Lyman Chapin
Chairman
Internet Activities Board,
Chief network architect
BBN Communications Corp.

Internet architect gives long-term view

Lyman Chapin, IAB chairman, highlights critical issues involved in running the world's largest net.

While the success of the Internet has sparked interest worldwide, it has also raised managerial problems and questions about its long-term direction.

One of the overseers tackling these issues is Lyman Chapin, chief network architect for BBN Communications Corp., who succeeded Vinton Cerf, president of the Internet Society, as chairman of the Internet Activities Board (IAB) in January.

The IAB sets Internet standards and reviews the operations of two subsidiary groups, the Internet Engineering Task Force (IETF) and the Internet Research Task Force (IRTF).

In a recent interview with *Network World* Washington D.C. correspondent Ellen Messmer, Chapin addressed issues facing the Internet today.

What are the most important issues facing the Internet today?

The most important issues are those associated with the success of the Internet. In size and extent, it has grown beyond what any of us envisioned 10 years ago. It's easily the largest telecommunications network in the world. At last count, 110 countries were connected. The network routing tables are growing faster than administrators can upgrade them.

There is also the difficulty of management. There is a much broader group of interests using the network and the issue of commercialization. The scope of interest in the Internet community is broader now and you can no longer manage it as you used to, by calling up a few graduate students.

[With the Internet being used] by an enormous amount of people with business to conduct, we're going to have to come up with different policy models.

What are the long-range problems and opportunities for the Internet?

The biggest long-range problem is how the Internet will be managed. Before, it was sort of an insiders' club and there was no formal structure. The effort now is to try to promote the Internet Society [a nonprofit organization formed this January] as an overall umbrella to include the IAB as well as the IETF and the IRTF, both chartered by the IAB.

By incorporating ourselves in the Internet Society, we want to formulate our independence. Going back some years, the IAB was an advisory board implicitly beholden to the Federal Networking Council. The IAB is independent from the federal agencies.

The proposal for incorporation is published on the Internet as a request for comment and will be presented to the Internet Board of Trustees of the Internet Society on June 16. There will be a vote of the members of the board of trustees on whether to accept [it].

What about the growing shortage of Internet addresses?

(continued on page 46)

DEC users upbeat despite financials

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White's sentiment was echoed by Brad Cooper, manager of network services at Millsaps College in Jackson, Miss.

"I think they're hedging their bets by going with Microsoft and other people's standards just to make sure they survive," he said.

Cooper also said he believes networking will be key to DEC's recovery. DEC, he said, will see "an incredible return" on sales of its Pathworks network operating system over the next two years after a version for Novell, Inc. NetWare local-area networks begins shipping.

DEC will be able to leverage Novell's installed base and tap its own desktop integration and service prowess once the version of Pathworks for NetWare is in the pipeline, Cooper said.

As for DEC's current financial and managerial situation, Cooper said of his principal network supplier, "I'm not shaken. I don't see my boss shaken. I don't see his bosses shaken. They're just looking to buy more stuff at good prices."

User optimism may have been buoyed by Olsen, who sought to refute charges that he was out of touch and that DEC needed to drastically cut its head count.

Olsen held an hour-long press conference on the inaugural day of the DECworld '92 to introduce six company executives and describe their duties. He also said DEC is now an application and "solution" provider instead of a company that makes computers first and then tries to convince users to buy them.

And he stated emphatically that he will not assuage Wall Street and attempt to provide a quick fix to DEC's financial woes by setting a goal for reducing staff. He was responding to published reports quoting analysts saying that DEC planned to cut 10,000 in fiscal 1992.

"There are a number of suggestions that we have to make vast cuts in our population and in our assets," Olsen explained. "We've generated a problem for ourselves. It's very expensive to sell [our product] because of the way we present our computers.

"I think that cutting out half of the sales people doesn't solve the problem. It does on paper to some consultant. But I refuse to have wholesale cuts just because [of what] some consultant says," he added. ◻

DEC outlines high-speed switch plans

BOSTON — Digital Equipment Corp. plans to ship a high-throughput switch for interconnecting multivendor systems, Fiber Distributed Data Interface local-area networks and other switches by year end or early 1993.

DEC's GIGAswitch, outlined at DECworld '92 recently, will feature a crossbar switch architecture. It will have the potential to achieve aggregate throughput of 3.6G bit/sec and make more than six million dynamic point-to-point connections per second between attached devices.

GIGAswitch will support 22 FDDI ports for connecting LANs and other devices, such as bridges, routers and concentrators. Through routers and data service units, devices connected by GIGAswitch can communicate with other devices at remote sites.

Interconnecting FDDI nets will enable users to create much larger networks, said Mahendra Patel, DEC's technical director for systems engineering.

GIGAswitch is designed for users of bandwidth-intensive applications who need more throughput than they can achieve from a single, fully loaded 100M bit/sec FDDI net. Such applications include multimedia, imaging, videoconferencing, LAN interconnection and file sharing between high-performance systems in distributed, client/server environments.

Currently, there is no product on the market that will compete directly with GIGAswitch, according to Paul Callahan, an analyst at Forrester Research, Inc. in Cambridge, Mass. Higher performance bridges and routers support three or four FDDI connections, he said, while GIGAswitch's FDDI capacity makes it "almost two orders of magnitude faster."

DEC plans to add multiprotocol routing modules to GIGAswitch in the future. Pricing information is not yet available.

— Jim Duffy

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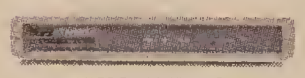
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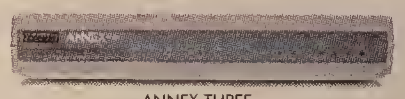
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NM Forum adopts two new membership levels

By Bob Brown
Senior Editor

BERNARDSVILLE, N.J. — The Network Management (NM) Forum last week announced the addition of two new membership classifications — one to attract users and another to woo small and midsize vendors to join the organization.

The forum, based here, is trying to promote worldwide acceptance and implementation of a common approach to network and systems management by devising its own specifications and working with other industry fora. The NM Forum is currently dominated by large vendors, although it sponsors the User Advisory Council, a group of user watchdogs.

The NM Forum's new affiliate membership category is designed to bring more users into the forum itself. Privileges include having a voice in forum work, admission to forum general meetings, discounts on published specifications and access to forum information. The affiliate category, which is open to any user, university or nonprofit organization, charges annual dues of $1,000.

"By involving themselves in the forum, users now have a direct line to the key players who develop products, services and standards," said Elizabeth Adams, the NM Forum's managing director. "Users should view this as an opportunity to join forces and lobby the industry for solutions they need."

The corporate membership category, aimed at smaller vendors, offers such privileges as having input into the direction and content of forum programs and specifications, as well as discounts on published specifications.

Corporate members will pay annual dues of $15,000 and be required to contribute the equivalent of one-half year of an employee's time to the forum's technical or marketing programs.

The corporate membership category falls between the two existing forum categories — board and associate.

Board members vote on NM Forum policies and specifications, and largely set the group's direction. Board members pay $55,000 a year in dues and contribute 2.5 man-years of work to the forum. Associate members, who pay $12,500 a year in dues, have access to forum information but little opportunity to influence the group.

For more information, contact the forum office at (908) 766-1544. ◼

Industry Briefs

continued from page 37

ARDIS to upgrade net. ARDIS Co. has announced a $150 million, multiyear agreement with Motorola, Inc.'s Mobile Data Division under which the carrier will buy gear to upgrade its network.

ARDIS, which operates a wireless data net dubbed ARDISNET, is a joint venture of IBM and Motorola.

The upgrade involves adding more than 900 new base station transmitter/receivers that will enable users to communicate on existing 4.8K bit/sec radio channels and new 19.2K bit/sec channels.

ARDIS will also complete the implementation of an automatic roaming capability that will allow subscribers to travel from city to city while maintaining communications links.

Vitalink to resell gear. Vitalink Communications Corp. last week announced plans to resell Digital Link Corp.'s line of T-3 multiplexers and T-1 and fractional T-1 data service unit/channel service units (DSU/CSU).

Under terms of the agreement, Vitalink will sell and support Digital Link's DL3000 and DL3100 Digital Service Multiplexer products in the U.S. Vitalink will also resell Digital Link's DL551VX T-1 DSU/CSU and the DL551VX-FT fractional T-1 DSU/CSU.

Digital Link is based in Sunnyvale, Calif., and Vitalink is located in Fremont, Calif. ◼

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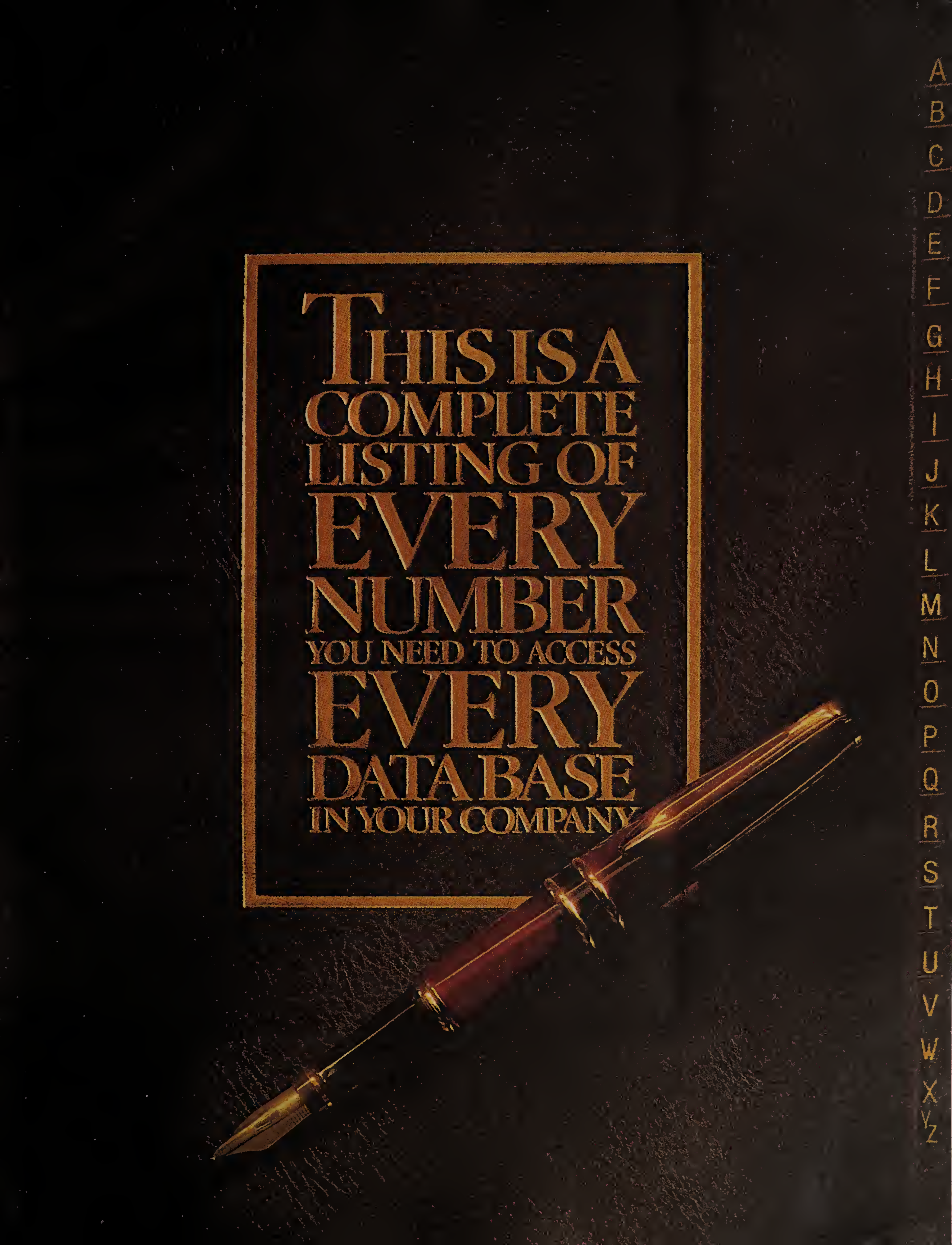
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The right choice.

Internet architect gives long-term view

continued from page 37

It's definitely considered the most significant engineering problem on the Internet now. A new group has been given the mandate to come up with a proposal to solve the problem.

There are three classes of Internet addresses [based on a 32-bit addressing scheme]. Class A addresses are too big [for most companies and organizations]; they can accommodate 2^{24} number of hosts. Class B can include just over 65,000 hosts. With Class C, only 256 hosts can be on the network. Class C isn't big enough for most users, and we're running out of Class B addresses. The operations people believe we will run out of Class B addresses in 12 to 24 months. Solutions on the table include one called "supernetting" — taking a group of Class C addresses and issuing them as a block. If they're contiguous, you've created something between Class A and Class C.

The downside is you're making the routing table problem worse. The number of routes to all possible destinations becomes so large, there's no memory in the router to store them. We're facing the absolute depletion of Internet addresses in five years.

The most comprehensive solution is to replace the Internet Protocol in the Internet with the Open Systems Interconnection Connectionless Network Protocol. That idea is already almost universally accepted. The process would involve replacing IP with OSI in the National Science Foundation backbone. The regional networks already have installed the ability to switch CLNP traffic.

It would not mean a wholesale shift to OSI, but it means the things incorporated in OSI are useful. Ultimately, the operators of the networks would have to agree to do it. We would still be running TCP but running it over CLNP. There are very small differences between CLNP and IP.

As the new IAB chairman, what agenda do you bring to the table?

My background is in OSI and the vendor community, as opposed to the traditional research and government agencies. One of the most important things I see is putting an end to what I call the protocol wars. The Internet is an inherently multiprotocol environment. The Internet includes X.400 and X.500 directions, and some OSI packet-switching in CLNP. [I suggest we] think of the evolution of the Internet as something independent of the protocol suite [and that] we talk about a multiprotocol Internet rather than just TCP/IP.

In your view, what are the most important new Internet standards?

The Multipurpose Internet Mail Extension is one of the most interesting things. Privacy Enhanced Mail, originally standardized in 1989, is now undergoing a revision. We're about to approve a new set of three documents that will be a second edition of Privacy Enhanced Mail. It adds confidentiality and message authentication. It's based on RSA [Data Security, Inc.] public-key encryption. One other standard is a set of security protocols for SNMP. Currently, there are no security mechanisms in SNMP.

Regarding OSI, how will the Internet accommodate OSI or coexist with TCP/IP?

The traditional way of looking at TCP/IP and OSI would be that TCP/IP would go away and be replaced by OSI. That is clearly not going to happen. One cannot imagine a scenario of a pure transition from TCP/IP to OSI. But parts of the OSI work can be adopted by the Internet. The Internet architecture has evolved, so it's not pure TCP/IP but not pure OSI.

Trying to get everyone to do everything the same way is utopian. But everyone needs to know what everyone else is doing. This will only work if we're successful in deploying directories.

There are two models today, the current Domain Name System and X.500. There's a process going on of merging [the two] that will be based on the X.500 standard, but it is not an X.500 system. The deployment of the directory will be demand-driven. IAB is trying to encourage the widespread deployment of DNS — the list of host names with Internet addresses — but later, we'll deploy something like X.500.

Should the Internet continue to play the role of both an operational and experimental network?

I believe very strongly the Internet must be both an operational and an experimental network. Experimentation is inevitable. One of the goals of the National Research and Education Network is to determine the feasibility of gigabit networking. Everyone wants to use the new T-3 speeds and then jump to the [Synchronous Optical Network] OC-12 speeds.

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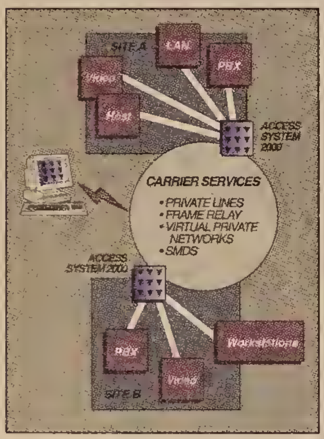

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Manager Minutes

Capital Holdings Corp., a large Louisville, Ky.-based insurance holding company, recently recognized three network managers for their outstanding contributions to the company.

The net managers received the firm's Values in Action award for working together across divisional lines and slashing $650,000 a year off the firm's telecommunications bill. The managers pooled inbound and outbound voice traffic from their respective divisions and negotiated a multiyear contract with MCI Communications Corp. for virtual network services.

The award recipients were: Eric Schmall, director of telecommunications at Capital Holdings and contributing columnist to *Network World;* Mike Chandler, manager of data and networks at National Liberty Corp. in Valley Forge Pa., and Karla Kelly, manager of telecommunications for First Deposit Corp. in San Francisco.

The **Communications Managers Association** has announced that it has given membership status to four vendors: Farmstead Telephone Group, Inc., MCI Communications Corp., Nynex Corp. and WilTel Communications Systems, Inc. ◼

Users unite to spur growth of distributed computing

Forum to define user requirements for vendors.

By Wayne Eckerson
Senior Editor

SANTA BARBARA, Calif. — Application developers at user companies are establishing a group to accelerate and steer development of distributed object computing tools and services, *Network World* has learned.

An initial proposal outlining the mission of the user group, dubbed the Forum on Distributed Computing, was informally distributed at the recent Fourth Annual Executive UniForum Symposium here, a conference that addresses open systems issues.

The proposal was prepared by Patricia Seybold's Office Computing Group, a Boston research and consulting firm specializing in distributed computing. It grew out of discussions among users attending a Seybold Group conference last month on distributed computing.

Twenty-four users have voiced plans to join the forum, which would be administered by the Seybold Group, according to John Rymer, a vice-president at the Seybold Group and author of the proposal. He added that the forum may work closely with the Object Management Group (OMG), which includes about 270 vendors of object-oriented technologies.

The proposal states there is a critical mass of users looking to use object-oriented technologies for building distributed computing applications. But users are frustrated by a lack of tools, services and support needed to build distributed object computing networks.

"Vendors don't understand what users need to put distributed object computing to work on a wide variety of applications," the proposal says. "Vendors don't realize how quickly distributed object computing is catching on. To be fair, distributed object computing has emerged so suddenly that few completely understand what's happening and what the implications are."

The proposal criticizes vendors for not providing tools and services to support distributed object computing, including network and operating system services, security and data access services, system and network management tools and services. It also criticizes vendors for failing to offer products that are portable across platforms and can interoperate.

The forum would attempt to close the gap between user needs

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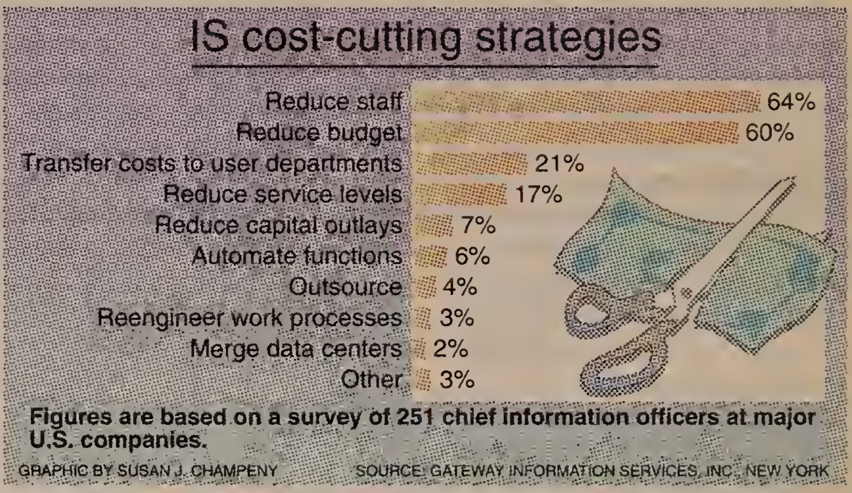

Figures are based on a survey of 251 chief information officers at major U.S. companies.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: GATEWAY INFORMATION SERVICES, INC., NEW YORK

Cost issues still loom as economy brightens

NW panel members discuss impact of improving economy on budgets and major network projects.

By Skip MacAskill
Staff Writer

While the economy begins to struggle free from the grip of recession, network managers are continuing efforts to improve the efficiency of operations and fine-tune network strategies to provide more services with fewer resources, according to members of *Network World's* User Advisory Panel.

The panel, which comprises top network executives from companies in a range of industries as well as representatives of leading user groups, said the promised economic turnaround may loosen purse strings at their firms but fiscal caution is still the watchword.

"Many managers concentrate on the technical [aspects] of their networks, but the recession has forced them to deal with the financial implications, as well," said Len Evenchik, director of communications for the Commonwealth of Massachusetts. "Network organizations do the technical planning and operations work as a given. The recession has caused these organiza-

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MANAGING TECHNOLOGY

BY JOHN DIX

Commonsense approach to management riddles

Perhaps no one has ever peeled back the layers of the management onion to reveal the gleaming white truth at the core as elegantly as Tom Watson, who simply encouraged his staff at IBM to "Think."

Watson, who founded IBM in 1914, had a large "Think" sign on the wall behind his desk and others like it scattered around the company. While beautiful in its simplicity, a philosophy that is reduced to a single word can obscure the message.

"So what?" one might say. "I think all day long."

But evidence that we could all stand to think more constructively is as close as a recent event that left you wondering, "Why didn't I think of that?" or "Why didn't I get out of that what I needed to make an educated decision?"

Such constructive thinking can help eliminate that frustration. And you don't have to read a management book, listen to a dozen tapes or attend management seminars to learn how to improve this ability.

The key is to drive the thinking process by learning how to ask yourself the right questions. Some people do this instinctively. Others can benefit by practicing it more often.

Learning from the past

A good place to begin is to think back to one of those moments that left you feeling like a dunderhead for not recognizing the obvious.

With that in mind, ask yourself, "What questions could I have asked myself beforehand that could have led to a better outcome?"

Constructive thinking driven by this type of questioning process can be used to approach any situation, from negotiating to interviewing.

For example, a famous learn-at-home tape series on negotiating presents this scenario: A real estate developer wants to buy a piece of property to build a shopping mall, but the elderly owner doesn't seem interested in selling.

Instead of seeking the counsel of this negotiating expert, as the buyer did, what if he had started examining the problem

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Thinking through management riddles

continued from page 47

by asking himself, "Why can't I convince this guy to sell the land?"

The line of reasoning can go anywhere from there. The idea is to take off on one branch of thought, and let it run its course before taking on another. The next question in this scenario might be, "Is there anything else I could do to swing the deal?" The most obvious answer would be to offer the landowner more money. But he doesn't seem interested in money.

Click. A major step forward.

"If it isn't money the guy wants, what is it that makes him tick?"

As it turns out, the buyer finally realizes he took the seller's needs for granted, forgetting that the owner may be motivated by things other than money. In the tape's example, the owner sold out when the buyer offered to name the shopping center after him, which appealed to his ego.

In an example closer to home, consider the employee interview process. The tendency is to discuss the applicant's job history and qualifications, describe the position and discuss how well the applicant's qualifications map into the job.

But many managers come away from interviews lacking the information they need to make intelligent hiring decisions because they never stop to assess what skills are really important for the job. Instead, decisions are usually governed by intangibles, such as the person's air, appearance and conversational style.

As simple as it sounds, the first question managers should ask themselves in preparation for an interview is, "What qualities does a candidate need to succeed in this position?" Maybe it's attention to detail. Maybe it's patience, creativity or team spirit. Once the desired qualifications are identified, the next step is to map out interview questions that would reveal whether the applicant possesses those qualities.

More often than not, this will lead to something of a startling conclusion: Most of the traditional lines of questioning about a person's qualifications are fruitless. The best questions tend to be those that provide insight into how people think and how they will perform on the job. Such questions might be, "If you were confronted with this situation, how would you handle it?" or "What do you think you would enjoy most about this job?"

The key to constructive thinking is to do what Watson implored his staff to do: Think. Said another way: Prepare. Analyzing a situation and preparing yourself to deal with it by using deductive questioning can be a simple and productive way to improve your decision-making abilities. ◘

Dix is executive editor for Network World.

Users unite to spur growth of technology

continued from page 47

and vendor offerings, Rymer said. Also, the group would identify user requirements and show vendors that there is a viable market for the tools and services needed to support those requirements.

Rymer said OMG President Christopher Stone wants to establish the forum as a special subcommittee to OMG's board of directors. The forum would have direct access to leading vendors in OMG without opening up its membership to vendors. Stone views the forum as a good vehicle for feeding input from users into OMG's technology definition processes.

Rymer will meet with Stone this month to finalize the forum's role in OMG. Once an agreement is reached, the group will officially debut.

A different approach

The forum aims to differ from traditional user groups or advanced technology consortia that present user requirements without first ensuring there is a sufficient market demand for products based on those requirements.

In the past, vendors have invested time and money in developing products based on consortia requirements only to find that few users were interested in purchasing them.

The group plans to present profiles or portraits of user companies that would describe users' technical and business requirements for distributed object computing.

The profiles would emerge from discussions among forum members regarding migration to distributed object computing architectures. The Seybold Group will facilitate the discussions, which will be held on-line via facsimile or some other electronic communications medium.

For more information, contact John Rymer at (617) 742-5200, Ext. 104 or message him at jrymer@mcimail.com or 70673,2067 through CompuServe, Inc. ◘

SMDS

FRAME RELAY

ATM.

QUESTIONS?

Cost issues loom as economy brightens

continued from page 47

tions to address financial management issues with the same vigor."

Net managers are starting to get approval to move forward with some projects, but many of these are focused on cost containment rather than network expansion or service enhancement.

"Firms that had projects on hold are finally getting authorization to do those things, and those projects center on network optimization and cost savings," said Thomas Festa, communications director for Liberty Brokerage, Inc.

Festa said financial firms were better prepared to weather the recession because they experienced the economic downturn early on. "We were in a recession — I'd almost say a depression — here on Wall Street back in 1987," Festa said. "Most companies reacted by cutting staffs, network personnel and other cost items. You had to go down there with a knife and make those cuts as well as find some alternative ways to do the same job."

For Festa's company, that meant turning to solutions such as virtual private network services and lobbying with others in the industry to get vendors to help in cutting costs. That work and the economic rebound are starting to have an effect.

"Things have been stable long enough that people have been able to maintain staffs and actually start to add on a little," he said. "Right now, the general attitude on the street is that things are coming back slowly but surely. The financial firms are probably slightly ahead of what may be going to happen down the road, but the news is not great. It's taken us from 1988 until now to make our turnaround."

Things are different for net managers in state and local governments. "In the state and local government sectors, things continue to be tight and we expect them to be tight for some time," Evenchik said. "We, and other states, are implementing stricter financial and management controls, such as better accounting systems."

Fiscally strapped Massachusetts, for example, is undergoing a statewide network audit using three outside contractors. The goal is to get back any refunds due the commonwealth for services that were incorrectly billed and establish an up-to-date network inventory.

"Despite the cuts, our service hasn't [been affected]," he said, noting that the silver lining has been the emphasis on cost control and the moneys recouped via the audit.

One bright spot from the recession? Financial concerns actually increased network usage in many companies. "The recession generated greater use of [network] facilities in lieu of, for example, travel and other forms of communication," said Stanley Welland, manager of corporate telecommunications for General Electric Co.

Staff reductions or drastic cost-cutting measures were not needed at GE because the network department has always emphasized fiscal caution. "We're always looking at our cost structure, and that allowed us to function as we always had during the recession," Welland added. "One [area of focus] has always been — and will continue to be — on cost reduction and efficiency."

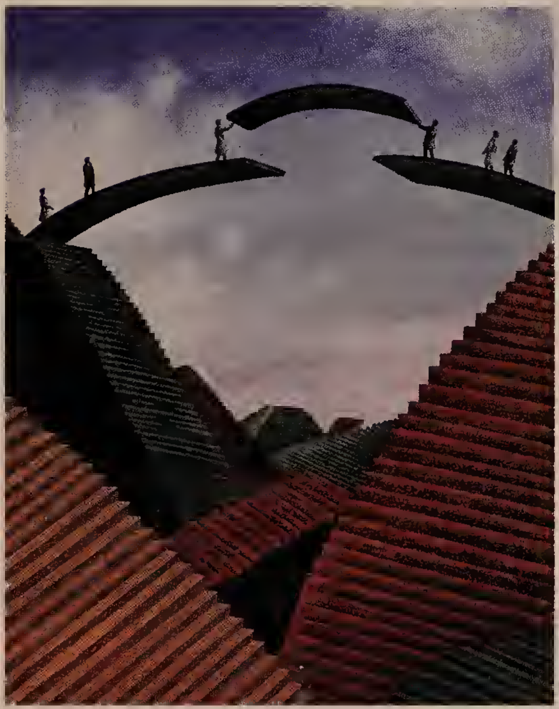
But the recession has made cost containment a focal point for many other managers. "The recession has made everyone a lot more cautious about where money is being spent," said Ron Kopitowsky, telecommunications director for the Metropolitan Transportation Authority of New York State and former president of the Communications Managers Association. "Every [network] change requiring some dollars must have the financial aspects presented in order to gain approval. There are a lot of opportunities that have good financials, so it's just a question of prioritizing and implementing them."

Robert Hamilton, an information technology engineer at Hewlett-Packard Co. and president of the Tele-Communications Association, Inc., agreed. "The focus has shifted to emphasizing the economics of things more — getting more for the dollar," he said. "A lot of managers are consolidating because it is easier to install a T-1 than a bunch of smaller single lines."

This situation has made managers more creative in many ways, Hamilton claimed. "The recession has really pushed us to use our creativity," he said. "We found that our engineers and technicians are starting to think more innovatively and creatively because they can't just go buy something anymore."

Hamilton said he believes that the economic outlook is beginning to improve for many net managers but a cautious strategy is still best. "Things are getting better, but we need to take a slow, cautious approach," he said. "Hopefully, we've learned some things from what we've gone through and we won't get ourselves too far out on a limb in the future."

ANSWERS.



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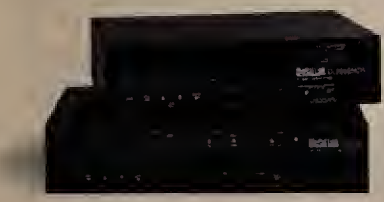

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INTERNATIONAL ISSUES

BY STUART BROTMAN

U.S. support for CIS net modernization would help users

The development of the communications infrastructure in the former Soviet Union is a matter of great significance to U.S. companies. Many multinational corporations are eagerly awaiting the introduction of the high-speed voice and data services that will enable them to expand operations into the recently opened markets there. The U.S. should, therefore, support every effort to help the Commonwealth of Independent States (CIS) modernize its communications infrastructure.

While significant, President Bush's recently unveiled $24 billion aid package to Russia has enabled the Bush administration to defer a decision about whether to alleviate telecommunications export controls over the former Soviet Union. At last year's meeting of the international Coordinating Committee on Multilateral Export Controls (COCOMM) in Paris, the U.S. lifted restrictions that ban the sale of certain telecommunications and computer equipment to Russia. But it also took a hard-line position in favor of retaining strict controls on the sale of equipment needed to build fiber links inside Russia.

> The U.S. should help the CIS modernize its communications infrastructure.
>
> ▲▲▲

This action brought to a halt a plan supported by Germany and the U.K., among others, to construct a trans-Siberian fiber-based communications line. Such a link would have enabled Russia and other members of the CIS to put in place a modern telecommunications infrastructure connecting the republics with one another and with the rest of the world.

The U.S. argued that national security interests supported the continuation of the fiber-optic export ban since it is difficult to intercept messages transmitted over state-of-the-art fiber-based telecommunications systems. This concern should not be minimized, particularly since the military and political stability of the CIS remains unclear. On the other hand, it should not be waved about without a compelling argument that supports a continuing fiber-optic ban. To date, the Bush administration has prevailed by appealing to a lingering Cold War mentality, rather than by presenting evidence to support its claims.

Moreover, even if the fiber-optic ban is retained in some form, the U.S. will be hard-pressed to make the same national security case when other important telecommunications technologies, such as advanced cellular systems, are at issue. If the CIS were allowed to install cellular systems, the Western intelligence community would still be able to intercept voice and data messages covertly. So far, the Bush administration has skirted relaxing bans on cellular technologies by keeping them off the agenda for the COCOMM meeting.

Ironically, the end result of the U.S. reluctance to relax the fiber-optic ban could be a contribution to Russia's fragility instead of its strength. As long as it has the proven defense of national security to run up the flagpole, the U.S. will continue to hold back the one thing U.S. companies need to compete globally — better communications links. ◼

Brotman, a Boston-based lawyer and management consultant, teaches international communications law and policy at the Fletcher School of Law and Diplomacy at Tufts University.

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EDITORIAL

Putting your old technology to work for a better world

In the past decade, we've been witness to global change of profound dimensions. Democracy has supplanted crushing political regimes in many parts of the world, often at a cost measured in human lives.

Too often, we feel powerless to assist people around the world fighting for freedom and basic human rights. But there is a way you can help.

The East West Education Development Foundation is offering an opportunity for firms to help spur the advance of democracy and capitalism by giving computer and network technology to universities, research institutes and nonprofit organizations around the world that promote freedom of speech, science and entrepreneurship.

The foundation is the brainchild of Patrick McGovern, founder of International Data Group, which publishes this newsweekly and scores of other high-technology journals around the world. It is a nonprofit organization dedicated to helping people by promoting the rapid and unfettered exchange of information.

The foundation needs donations of excess computer and network inventory as well as equipment being replaced by newer technology. It also welcomes monetary donations that help defray the cost of equipment pickup, delivery, packaging and storage. All donations are tax deductible and can save you the trouble of selling displaced equipment.

Over 70 companies have given their support to the foundation, including Bank of Boston Corp., the Boston Computer Exchange, Lotus Development Corp. and Novell, Inc.

The foundation's donations have included laptops sent to a foreign policy school in Moscow run by former Soviet Foreign Minister Eduard Shevardnadze and to journalism students at the University of Moscow, Comenius Academy in Czechoslovakia and Charles University in Prague.

For information on how you can help, call (617) 542-1234 or write to the East West Education Development Foundation at 49 Temple Place, Boston, Mass. 02111. You can turn your older technology into a powerful force for change. ◼

INTERNETWORKS

BY JAMES KOBIELUS

Facing the challenge of optimizing net applications

Networks can be as hard to tune as a harp with 10,000 strings. But despite the difficulties, net managers should aggressively address the network performance issues surrounding distributed applications.

To guarantee superior performance for distributed applications, net managers should take the following steps.

First, they should establish performance criteria, such as setup time, response time, throughput, availability, bit error rate, jitter and packet loss.

In addition, every net manager should maintain an updated network map that displays hardware, software, circuits and wiring. The map must allow technicians to identify the complete path of any application session or transaction so the impact of each node or link on end-to-end performance may be assessed.

Communications managers can use the network map to identify technical constraints that affect the performance of distributed applications.

Such constraints or bottlenecks fall into three general classes: workstation and server constraints, local-area network limitations and internetwork constraints.

The workstation and server constraints include number and speed of CPUs, amount of random-access memory, system-bus width, and disk capacity and disk access time. The LAN bottlenecks could be the network I/O buffer size, bandwidth and frame/block size, while the internetwork constraints include the backbone data rate, packet buffering, window size, router/bridge efficiency, packet acknowledgment requirements and hop count.

All of these variables must be considered when troubleshooting distributed applications.

Unfortunately, during these recessionary times, most network developers can justify acquiring more processing, storage and transmission capacity only for the most mission-critical applications. Thus, net managers must make sure distributed applications aren't chewing up bandwidth needlessly.

Generally, when addressing bottlenecks, developers are forced by circumstances to use several approaches to improve the design of distributed application software.

Functional specification and partitioning is the favored approach for client/server applications, which generally put display-intensive chores on workstations and I/O-intensive operations on shared departmental servers.

Remote procedure calls are essential tools for building specialized, distributed application components. Functional specification and partitioning reduces the volume of information transmitted between nodes on a network, thus improving net performance.

Compression is another approach that addresses the bandwidth bottleneck by removing redundant or unnecessary information from the transmitted signal. One powerful compression technique is to send only those instructions needed to reconstruct an image or object at the receiving end, as opposed to sending the data that comprises that image or object.

Another technique is to use protocols that stuff large amounts of data into a frame, making it possible to send a large data file using fewer frames than would be required with another protocol. The advantage to this technique is a reduction in overhead because there is much less control information sent across the network.

Using a third approach, parallelization, which views computer processing architectures as a bottleneck, distributed application developers can expand application efficiency by increasing the number of processes that are performed in parallel rather than sequentially.

Software parallelization uses techniques such as multicasting, multithreading and multitasking to coax greater throughput from dispersed computers. With such techniques, a client, for example, would wait a shorter time period for a server to perform because the server performs several tasks at once, thus improving response time.

Finally, when troubleshooting distributed applications, developers should remember that exclusive file locks can be a source of bottlenecks on the network. Developers must continually review locking schemes built into distributed applications. Nonexclusive locks will speed access to users who need information and reduce user holding times.

Application fine-tuning is a trial-and-error process of monitoring, diagnosing, reconfiguring and testing. Internetworks are ferociously difficult environments to optimize. Technicians must use every tool at their disposal to limit the domain of performance problems to specific devices, circuits or subnetworks.

Above all else, network managers must learn to be patient and persistent when fine-tuning distributed applications. No application will ever be optimized once and for all. ◼

Kobielus, a contributing editor to Network World, *is a telecommunications analyst with Fairfax, Va.-based Network Management, Inc., one of the largest local- and wide-area network systems integrators in the U.S.*

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To obtain a survey form, call Charles Bruno, features editor, at (508) 875-6400, Ext. 414.

TELETOONS

BY FRANK AND TROISE

Great Moments in Networking
March 27, 1988.. Cleveland, Ohio. Noted medium Madame Zuma receives the first E-mail message from the Great Beyond.
Yes.. it's becoming clear now.. Geez! Your late husband is a lousy speller.

LETTERS

Giving due credit

I am writing about your recent article on the Open Software Foundation, Inc.'s (OSF) Distributed Computing Environment (DCE) called "Taking a closer look at the DCE" *(NW,* March 30).

The article mentioned that Kerberos was developed at the Massachusetts Institute of Technology, that the University of Massachusetts at Amherst adopted the DCE and that the DCE is based on the Andrew File System (AFS) from Transarc Corp. But the article didn't mention that the AFS was originally developed at Carnegie-Mellon University in Pittsburgh.

In fact, Pittsburgh-based Transarc is a spin-off company from Carnegie-Mellon. The Andrew in AFS is from the names of Carnegie-Mellon's founders, Andrew Carnegie and Andrew Mellon. Carnegie-Mellon also developed the Mach operating system, on which OSF/1 is based.

I often see MIT get credit for the Kerberos in DCE, while Carnegie-Mellon gets no mention. In fact, Carnegie-Mellon was responsible for integrating Kerberos into AFS.

I want to ensure that Carnegie-Mellon gets the credit it deserves because a significant part of the DCE technology was developed there.

Eric Ewanco
Software engineer
Digital Equipment Corp.
Cambridge, Mass.

The reality of RDS

The spokesman for Computer Network Technology Corp. (CNT) quoted in your recent article "CNT unveils DASD inter-

(continued on page 61)

Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

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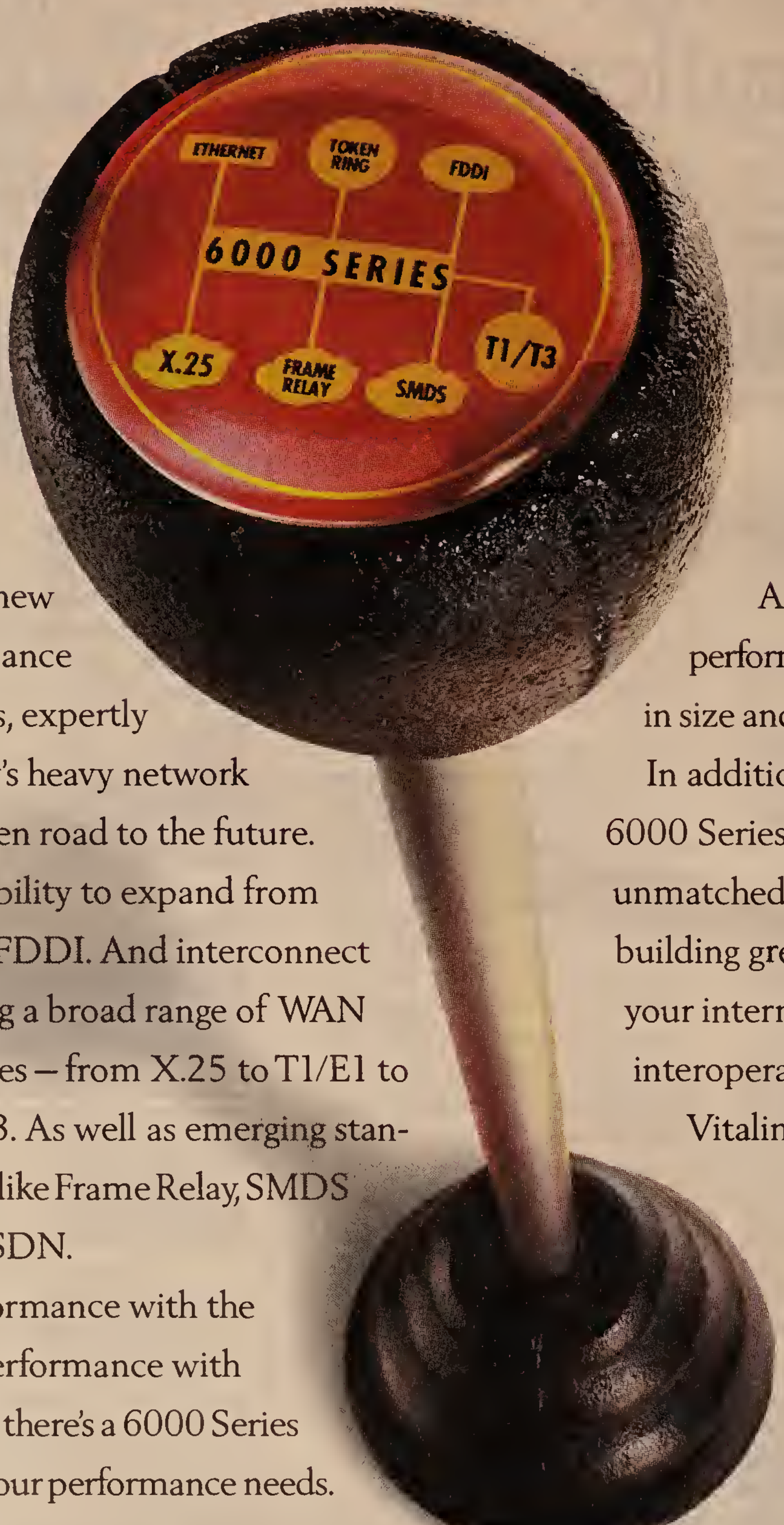

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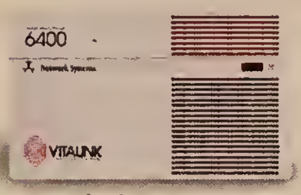

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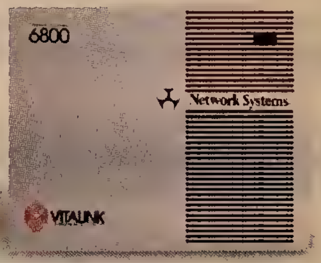

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GUIDE TO
STRATEGIC
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OPEN NET
MANAGEMENT
PLATFORMS

Looking for true openness in a closed world

By PAUL LI AND ERIC SMALLEY

When it comes to monitoring enterprisewide networks, users have long been expected to keep their eyes simultaneously peeled on multiple management consoles as if they were watching several tennis matches at once.

Now, though, network administrators' cries for a saner approach to net management are finally being heard. Integrated network management systems that provide a single system image of activity on local-area networks and events on internetworking equipment, as well as a view of more traditional terminal-based nets, are making their way to market.

These systems act as umbrella platforms that unite data from various specialty management systems and convey it to the network operator in a single composite map that can be viewed from a central management console.

For those organizations that employ several management systems manned by different personnel to oversee LANs and other net operations, the integrated management system promises to enable a single individual to monitor the entire net.

Integrated management systems, especially those based on open systems standards, will enable net managers to view the big picture of activity across the enterprise net and take remedial action not only to resolve problems, but also to prevent small glitches from getting out of hand.

These systems are being driven largely due to the proliferation of LANs, which have sent users looking for a more focused management system to control departmental as well as enterprise wide-area networks.

There's more to selecting an open network management system than meets the eye.

As a result, the purchase of an open network management system is a major buying decision that will have a lasting effect on the company and the way it manages its LANs and other devices such as internetworking equipment and even multiplexers and other systems ruled by their own element management systems.

While many major vendors are currently bringing integrated managers to market, few have focused on building truly open systems, preferring instead to mix support for standards in a proprietary environment.

There are some systems that can be classified as open network management systems because they mix support for open systems standards, such as the Simple Network Management Protocol, with open operating environments such as Unix.

The other major factor is the extent to which vendors open up the programming interfaces for third parties to write applications that can feed data to, as well as interact with, the umbrella manager.

Open and shut

There are many network management platforms currently on the market, most of which are pronounced open by their makers. These platforms can be divided into three categories.

At the top of the hierarchy are the so-called managers of managers. IBM's NetView, Digital Equipment Corp.'s DEC Management Control Center (DECmcc) Director and AT&T's Accumaster Integrator can be considered in this category. Manager of manager platforms are not meant so much to host a variety of management applications as to provide an overview of an entire network, from personal computer LANs to global data communications networks and even voice networks.

Another category of network management systems is the element management system provided by such vendors as Cabletron Systems, Inc., Concord Communications, Inc., Network General Corp. and SynOptics Communications, Inc. These platforms support some network management standards and relay net activity data to integrated network managers.

However, these vendors' platforms are not the primary focus of their network management efforts. Their efforts are centered on either expert systems technology or advanced capabilities such as protocol analysis.

The third category is LAN managers, which provide some degree of integrated network management. Hughes LAN Systems, Inc.'s Monet, Lexcel, Inc.'s Lance, The Wollongong Group, Inc.'s Management Station and NetLabs, Inc.'s DualManager fall under this category. These plat-

(continued on page 54)

Open network management systems

Features	Hewlett-Packard Co.'s OpenView (Network Node Manager, Network Management Server)	SunConnect's SunNet Manager
Hardware/operating system	HP's HP 9000/HP-UX; Sun Microsystems, Inc.'s SPARCsystem/SunOS	SPARCsystem/SunOS
User interface	Open Software Foundation, Inc.'s Motif	Sun's OpenLook and the X Window System
Database	Proprietary hierarchical database	SunConnect's NetISAM (1) run-time database
Fault management	Network verification, user-set thresholds, event and trap notification	Network verification, user-set thresholds, event and trap notification
Configuration management	Through Network Discovery, MIB Browser	Through Discovery
Performance management	Graphical reports on statistical data of devices and operating system loads	Data dumps, graphical reports on sampled data, comparative data graphing
Network management protocols	SNMP (Network Node Manager and Network Management Server); Common Management Information Protocol over TCP/IP (Network Management Server)	SNMP; Digital Equipment Corp.'s DECnet Network Information Control Exchange; FDDI station management protocol
End-user customization	Application Builder enables users to build custom menus; MIB extension support	Basic user tools enable users to build custom menus; MIB extension support
Third-party development	More than 100 development partners; APIs are based on open standards; Network Management Server must run or build third-party management applications	More than 50 development partners; proprietary but openly published APIs; development environment integrated with basic product
Price	Network Node Manager: $15,000; Network Management Server: $5,000; Developers' Kit: $25,000	$3,000

API = Application program interface
MIB = Management Information Base

FOOTNOTE:
(1) NetISAM is a Sun implementation of the index sequential access method

SOURCE: ERNST & YOUNG, BOSTON

(continued from page 53)

forms generally have the capability to manage sizable networks but — in contrast to manager of manager platforms — have been designed to manage work group environments. These platforms are used almost entirely in Unix-based Transmission Control Protocol/Internet Protocol networks.

These LAN manager platforms are comparable to the currently available versions of Hewlett-Packard Co.'s OpenView and SunConnect's SunNet Manager. They are platform-independent, can be customized by end users and are available with application program interfaces (API).

One of the most important criteria for an open network management platform is having standard or at least published APIs. While AT&T's Integrator and DEC's DECmcc Director have open interfaces to their management platforms, they do not provide integrated development environments.

Developers can link network devices or independent element managers to Integrator or DECmcc Director, but they cannot write applications that are integral parts of the platform.

Open network management systems provide the basics of LAN management. Their key attributes are a graphical user interface (GUI), support for industry-standard network management protocols, availability of a database management system, fault configuration and performance management capabilities.

Although definitions of open net management systems vary, one generally accepted description is a platform that operates in a multivendor environment without a proprietary management scheme or protocols, runs on a variety of hardware and software platforms, and provides a mechanism for third-party applications to either feed data to the umbrella manager or run in tandem with the application, according to Todd Dagres, director of data communications research and consulting for The Yankee Group, a Boston-based market research firm.

No single product today fully meets all of the requirements for being an open network management platform, but there are several that come close. Over the past two years, OpenView and SunNet Manager have been established as the market leaders in the LAN environment.

"I don't necessarily think of OpenView and SunNet Manager as open," Dagres said. Although they still harbor proprietary elements, both products are considered open because they operate in nets that support TCP/IP and Unix, he added.

Different intent

HP has positioned OpenView as a system for managing large networks that has the capability to work with a number of element managers. SunConnect, by contrast, has targeted SunNet Manager at work group-oriented users with smaller networks.

OpenView has more to offer as far as multivendor network management goes, but the test is whether HP can deliver on the promise of support for object-oriented technology, the Common Management Information Protocol (CMIP) and conformance to the Open Software Foundation, Inc.'s (OSF) Distributed Management Environment (DME).

With the current version of SunNet Manager, SunConnect appears to be taking a more tactical approach to managing TCP/IP nets. "If I have a TCP/IP site, I choose SunNet Manager," Dagres said. "If I have a large mixed environment and can live with some limitations for the next few years, I choose OpenView."

OpenView's case

The OpenView architecture is based on the Open Systems Interconnection Network Management Framework defined by the International Standards Organization. The architecture also supports the Network Management Forum specifications. In addition, HP supports the DME.

Today, OpenView consists of two core products: Network Node Manager Version 2.0 and the Network Management Server.

When it was first introduced in 1988, OpenView was DOS-based. Subsequently, HP offered a Unix version that is now the OpenView Network Node Manager. HP is soon planning to announce that it will roll both products into a single offering.

Network Node Manager and Network Management Server perform distinct roles. The former is an end-user application, while the latter integrates data from third-party applications in the OpenView environment. SunConnect combines both of those functions in its SunNet Manager.

In general, users have been impressed with OpenView's ease of installation. The capability to get OpenView up and running right away was a major selling point, according to Jack Carpenter, a senior systems analyst for Pacific Bell.

HP is also expected to provide native CMIP running over the OSI protocol stack. This will allow future versions of OpenView to communicate with other peer management applications supporting CMIP. The next version of OpenView is also expected to support an SQL database.

SunConnect's side

SunNet Manager, like OpenView, is based on the OSI Network Management Framework. SunNet Manager was introduced in the fall of 1989 and shipped the following year. Version 1.2 was released in the fall of 1991.

The software is a distributed application, meaning that it relies on so-called proxy agent software on local Sun Microsystems, Inc. nodes to accumulate LAN activity data and forward it to the net management console.

The user interface, Management Information Base (MIB) database and basic user tool functions reside on a central platform that serves as the console. Proxy agents manage both SNMP and non-SNMP devices, such as DECnet nodes.

Proxy agents communicate data to the management console via remote procedure calls (RPC). Proxy agents communicate with the managed nodes and devices via SNMP or other proprietary protocols.

Like HP, SunConnect is expected to soon announce a major upgrade to SunNet Manager that will boast such features as improved software installation.

SunConnect is also expected to provide a node discovery feature that automatically recognizes and monitors new nodes added to the net. It may also increase the number of proxy agents and the number of nodes it can manage.

Operating environment

There are 10 factors that net managers should weigh when considering any open network management system.

Ideally, the network management system should not be tied to any single computer or operating system. Users would benefit from products that support a range of hardware and software platforms. This would enable a user with a token-ring network to run the software on an OS/2 management console instead of being forced to use a Unix workstation.

HP's OpenView has an advantage over SunNet Manager in this area because the software runs on more than one platform.

HP's Network Node Manager and Network Management Server support two operating environments.

Currently, the products run on an HP 9000 running HP-UX, and the software is available for use on a Sun SPARCstation running SunOS. HP plans to roll out support for the OSF-1 operating systems and the DCE, according to HP officials.

SunConnect, by contrast, offers SunNet Manager for use in only one environment: a Sun SPARCstation running SunOS.

Regardless, both emphasize the Unix environment, which is preferred for LAN management systems due to its multitasking capabilities.

User interface

Integrated net management systems employ a range of user interfaces, with Microsoft Corp.'s Windows and IBM's Presentation Manager interfaces being generally accepted.

But to be truly open, an integrated management system should support the X Window System or OSF's Motif or Sun's OpenLook GUI standards. The GUI should also support mapping, which is the depiction of net nodes in a graphical form, and map customization.

Both OpenView and SunNet Manager provide standard GUIs that can automatically represent network elements and generate network maps. However, SunNet Manager provides the ability with its management database API to create custom maps, such as floor plans, and correlate them to elements defined in the database.

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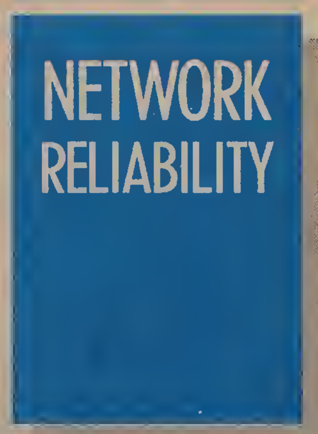

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OpenView supports OSF's Motif GUI, while SunNet Manager offers GUIs based on OpenLook and X Window. With OpenView's Network Node Manager, a dynamic map feature automatically generates and updates the map, eliminating the manual task of handling updates.

Under SunNet manager, network maps are generated easily by using a discovery feature, which automatically identifies new and existing nodes and paints a topological view of the net.

DBMSs fall short

Database management systems are a significant part of the open net management system because they store information for MIBs. The open net management system should include a database to track statistics over time. Ideally, the DBMS should be relational or object-oriented.

Neither product provides a relational database, a necessity for complex ad hoc queries and reports. However, HP provides a better facility to browse through MIB information in the database.

HP's Network Node Manager supports only a hierarchical proprietary database for MIB information. However, users have given HP high marks for its MIB Browser, a configuration management capability that enables users to view MIB database information in an instant.

SunNet Manager, by contrast, offers a database based on SunConnect's NetISAM, the company's implementation of the index sequential access method standard. MIB information is not directly accessible in a structured format via this setup.

Fault management

The ability for the software to provide event reporting and trap notification is arguably the most basic and necessary feature of the open net management system.

Both OpenView and SunNet Manager provide similar fault management features. Both allow users to run procedures and display messages for specific vendor device traps. A trap is a function that occurs when a local agent on a device detects an unusual occurrence. This triggers a trap that interrupts all operations and passes alert information off to a manager, warning of a change in node status. Both OpenView and SunNet Manager support private MIB extensions and can compile the extensions into their MIBs.

HP's Network Node Manager provides basic fault management capabilities using the TCP/IP ping command, which checks on the status of a device by polling it. A network manager can ping problem IP nodes to provide continuous network verification. Network Node Manager also changes on-screen icon colors to notify the network manager about events such as a device not responding to a request.

In addition, Network Node Manager allows net managers to set thresholds to generate alarms for conditions such as excessive network collisions. For SNMP devices that generate traps, Network Node Manager can display user-specified messages associated with the device.

SunNet Manager provides automated fault monitoring with its Event Reporting mechanism. The network manager defines a set of conditions, which should trigger an alarm. The mechanism polls selected devices for this information and receives traps generated by the devices. Like OpenView, SunNet Manager allows net managers to add trap responses.

Configuration issues

Any open net management product worth its weight will offer automatic identification of network nodes and should allow network managers to populate the MIB database without extensive data entry.

The OpenView Network Node Manager's Continuous Network Discovery feature automatically adds or deletes nodes as they appear on or drop off the network. This feature allows the network map and MIB Browser to function without requiring multiple SNMP set commands.

HP's MIB Browser lets the user automatically open a window into the MIB to view information or to define additional devices added to the MIB.

"The MIB Browser is a fantastic utility," said Meredith Price, network architect at Rockwell International Corp.'s Space Systems Division. "None of the other packages had that kind of capability, at least not with that fluency," he added (see "Checklist helps Rockwell unit pick mgmt. system," page 60).

SunNet Manager's Discovery feature provides configuration management by automatically populating the MIB database with the necessary information for map generation. This feature can also passively watch for new network nodes and add them to the database.

Performance management

It is apparent that all net management systems — open or not — could improve

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"Uh-Oh . . ." *Donna, Accounting*

"What The . . ." *Dan, Drafting*

"Hey!" *Todd, Shipping*

"Whoa!" *Jan, Production*

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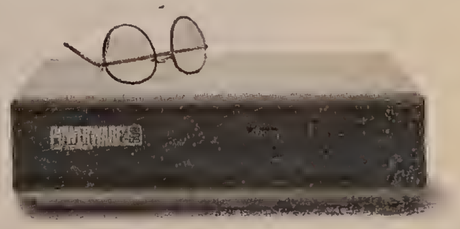

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in the area of performance management.

Network managers need to be able to analyze real-time and historical data and view network statistics in ways that make it easier to optimize network performance.

OpenView and SunNet Manager both provide some measure of performance management, but in general, they both lack the necessary tools for analyzing performance across the network. These capabilities are currently provided through other third-party applications or entirely separate management products.

To provide a measure of performance management, Network Node Manager allows users to graph statistical data for trend analysis and create reports from those graphs. The network manager sets the interval for polling nodes for statistical data. Operating system load and network traffic can also be recorded.

SunNet Manager provides the ability to monitor network performance through data dumps, which are graphical reports on sampled data and comparative data graphs.

SunNet Manager's basic user tools include the Custom Tools Integration feature, which allows the network manager to add custom functions that can be used by simply pointing and clicking a mouse. These tools link a user application or script to a user-created object. Like OpenView, SunNet Manager can compile vendor-specific extensions to the MIB.

Protocol support

Network management protocols can be divided into two classes — those providing manager-to-manager communications and those providing manager-to-agent communications.

Manager-to-manager protocols support the flow of data between two distributed managers in the network — between an element manager and Network Node Manager, for example — that need to communicate information to each other.

Manager-to-agent protocols support the flow of data from an agent on a downstream device that needs to pass activity reports to the Network Node Manager.

No vendor has yet to implement manager-to-manager protocols in an open net management product, relying instead on their own methods to pass data among managers.

Open net managers should support standard protocols in both classes, including SNMP, CMIP, CMIP over TCP/IP (CMOT) and RPCs. The ideal platform will also support the Fiber Distributed Data Interface Station Management (SMT) standard and any relevant vendor-specific management protocols.

Both products support the latest SNMP MIB standards, such as MIB II, and automatically update the MIB database and map when network configuration changes occur. The products also offer the capability to set object attributes without using the SNMP Set command explicitly.

HP and SunConnect both support SNMP for manager-to-agent communications. Currently, SunNet Manager supports SNMP, DEC's DECnet Network Information Control and Exchange as well as the FDDI SMT protocols.

HP's Network Management Server provides application developers with support for CMOT for manager-to-manager communications.

HP is expected to add native CMIP support for manager-to-manager communications. Sun, however, does not offer a manager-to-manager capability.

User customization

Open net management products should allow the network manager to not only adjust the user interface, but also to integrate third-party or user-built programs or applications.

Both the SunNet Manager and OpenView can be fairly easily customized by the network manager, either in the presentation of information on pull-down menus or in the way they handle traps.

Network Node Manager's Application Builder feature provides the network manager with a customization tool. Using the Application Builder, the net manager can link any MIB object query to any Network Node Manager function. Also, the Network Node Manager and Network Management Server provide a compiler to incorporate vendor-specific extensions to the MIB.

Unlike HP's offering, SunNet Manager enables third-party developers to use the same software as the end user to build new applications. The management platform provides the APIs that third-party developers need to build applications.

Developer links

Open network management platforms should include standard or at least published APIs that allow third-party software developers to write applications that are tightly integrated with the platform.

Both HP and SunConnect provide de-

(continued on page 61)

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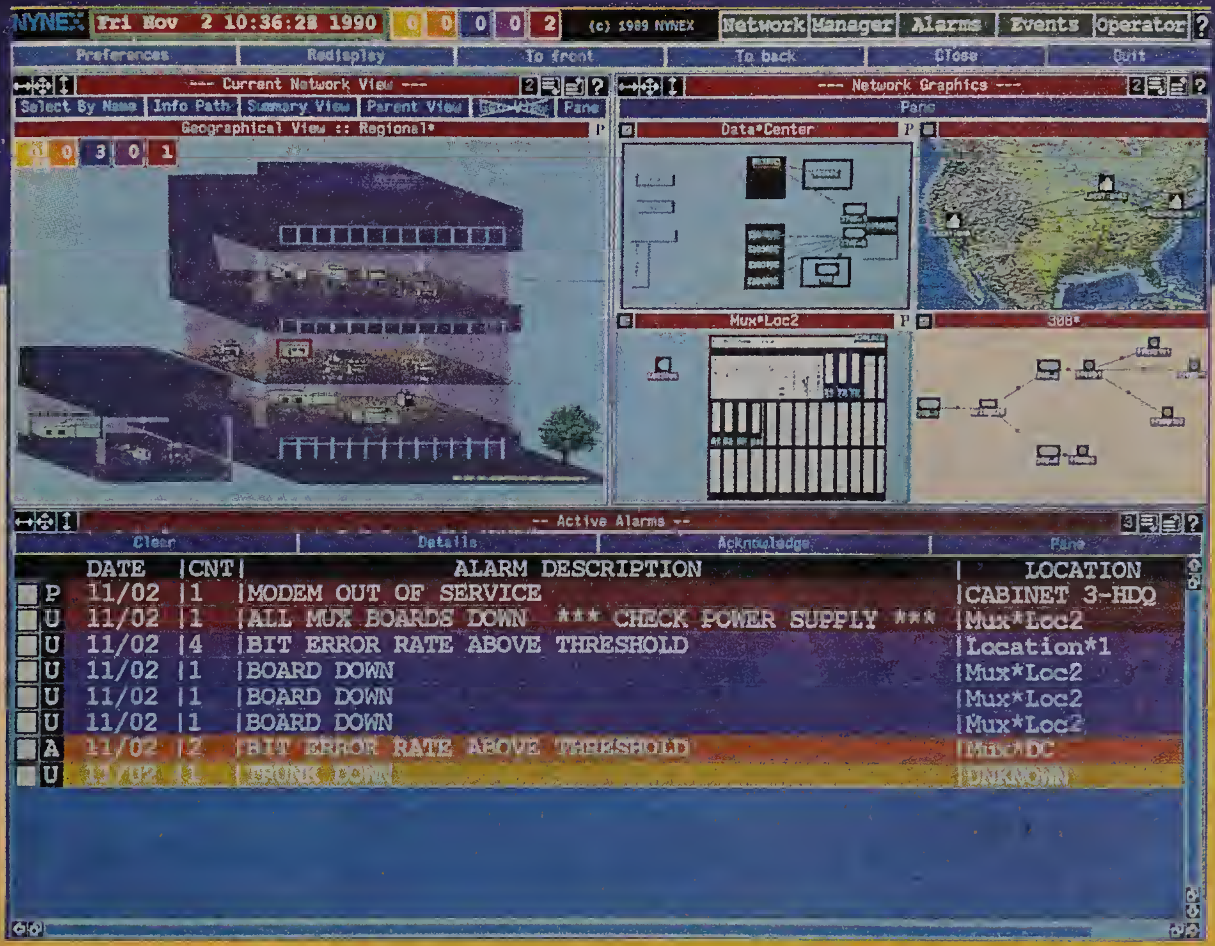

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  DATE  |CNT|            ALARM DESCRIPTION                     |   LOCATION
P 11/02 |1  |MODEM OUT OF SERVICE                              |CABINET 3-HDQ
U 11/02 |1  |ALL MUX BOARDS DOWN   *** CHECK POWER SUPPLY ***  |Mux*Loc2
U 11/02 |4  |BIT ERROR RATE ABOVE THRESHOLD                    |Location*1
U 11/02 |1  |BOARD DOWN                                        |Mux*Loc2
U 11/02 |1  |BOARD DOWN                                        |Mux*Loc2
U 11/02 |1  |BOARD DOWN                                        |Mux*Loc2
A 11/02 |2  |BIT ERROR RATE ABOVE THRESHOLD                    |Mux*DC
U 11/02 |1  |TRUNK DOWN                                        |UNKNOWN
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Checklist helps Rockwell unit pick mgmt. system

When Rockwell International Corp.'s Space Systems Division went shopping for a network management platform for its Transmission Control Protocol/ Internet Protocol network, the company used an extensive list of criteria to evaluate prospective purchases.

The 8,000-node network — part of Rockwell's corporate network that extends into Europe and Asia — includes devices from many vendors, according to Meredith Price, network engineer for the Downey, Calif.-based Space Systems Division.

"The first category of importance for us was vendor independence," he says. "We rated [network management platforms] on how dependent they are on a given device."

The company found that many management platforms are well adapted to managing a specific type of device or a particular vendor's model but not so many are as well suited to managing a broad range of devices, he adds.

With a multivendor TCP/IP network, support for standards is also important. The Space Systems Division considered support for the various Request For Comment Internet standards, such as the Simple Network Management Protocol.

The company also asked about each vendor's migration path to emerging standards, such as the Common Management Information Protocol, comparing their migration schedules to its own, Price says.

The Space Systems Division looked for a net management platform that would run under Unix and support the X Window System and, more specifically, one that would run on SunOS.

The division also took a close look at the database management systems supported in the various products and considered whether each had an interactive language.

"Also, does the database include what we call management graphics?" Price asks, explaining that some relational databases include a feature for generating graphics directly from their tables. "That's important so we don't have to dump data out. That allows ad hoc manipulation of the data."

These factors dictate how easily data can be analyzed and presented.

MIB installation

Another key buying factor the company considered was whether the system's Management Information Bases (MIB) can be installed by users.

According to Price, even though many products purportedly have MIBs that can be installed by users, the company was unable to load them on several of the platforms and had to bring in vendors to perform the task. With one product the company evaluated, it took up to three weeks to load a single MIB.

One important feature not supported by any of the products the Space Systems Division evaluated is what Price calls the "three-dimensionality" of hierarchical topologies.

An example of this is the ability to generate a single network submap showing only nodes that use a particular application, regardless of how many different sites the nodes occupy, Price explains.

"You want multiple ways of looking at the same data," he says. The company made its selection based partly on the promise of support for three-dimensional hierarchical topologies in a future release of the product.

After weighing all the factors and the supporting evidence, the Space Systems Division chose the Hewlett-Packard Co. OpenView Network Node Manager based on how well it meets these and other criteria, according to Price.

"I'd say it was an 80% match with what we needed," he says.

OpenView did lack a relational DBMS and support for Novell, Inc.'s NetWare and IBM's NetView, Price says. The Space Systems Division would like to be able to manage its NetWare local-area networks using OpenView and to link OpenView to NetView.

"The only Novell visibility we have [now] is where a particular vendor included Novell counters in its MIB trees," he says. "We'd like to tie in with Novell and NetView. The issue is how best to do that."

The Space Systems Division plans to deploy OpenView as an integrated net management system, according to Price.

The company is particularly impressed with OpenView's MIB Browser and Automatic Redraw features, he says. The MIB Browser provides a structured way to navigate through the MIB database.

The Automatic Redraw feature is associated with the platform's automatic discover capability. When a new node is discovered, Network Node Manager can automatically redraw the network map with the new node in place, rather than requiring the network administrator to manually update the map.

Network Node Manager "gave us no trouble when we uploaded our MIBs," Price says. "We were able to load all of our MIBs in a couple of hours."

— *Eric Smalley*

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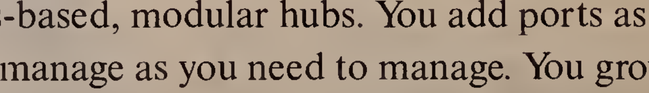

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(continued from page 59)

velopers with strong platforms to build applications. By themselves, OpenView and SunNet Manager do not provide all the capabilities needed to manage today's networks. However, both offer the capability to develop device-specific as well as function-specific element management systems.

Through the OpenView Solution Partners Program, third-party software developers can build applications using HP's Developers' Kit, which includes a run-time version of the OpenView Network Management Server.

Network Management Server also provides standard APIs, a GUI, communications services and protocols, and data management services for developers to build applications that conform to the OpenView architecture and are compatible with HP's OpenView products.

According to HP officials, more than 100 vendors have developed OpenView applications, some of which were initially developed on the OpenView/DOS platform. Now vendors are focusing on Unix versions.

The SunConnect Partners Program for Network Management provides third-party developers with the means to build applications on SunNet Manager. About 50 partners currently participate in this program, according to company officials. Developers are provided proprietary but openly published Manager Services, Agent Services, GUI and management data APIs.

Cost indicators

It is difficult to determine how much is too much to pay for network management. Prices vary because some vendors sell the software as an enticement to buy hardware or other layered software products, or as a means to ensure control of customer accounts.

By far, SunNet Manager is less expensive than HP's OpenView products. SunNet Manager software, including proxy agents, costs $3,000.

Even without the separate developers' platform, OpenView is considerably more expensive than SunNet Manager. The Network Node Manager alone costs $15,000. The Network Management Server costs $5,000, and the full Developers' Kit including the Network Management Server costs $25,000.

It is important to remember, however, that HP positions its product as an integrated network manager capable of uniting element managers that control LANs or other network devices. While SunNet Manager can also be used as an integrated net manager, its strength is in LAN management.

Outlook improves

Although users are somewhat limited in their choices of open network management systems today, the competition between HP and SunConnect along with the emergence of the OSF's DME should make the market more competitive while spawning a greater number of systems from which users can choose.

The DME will be critical for future products because it will enable LAN network management systems to run across different platforms and ensure that different management systems can communicate with one another.

But until that happens, users should recognize that there are numerous products available today that provide a limited breadth of open features and LAN management capabilities.

While NetView, for instance, may not fully embrace open standards such as Unix and SNMP, its open interfaces have given way to a significant pool of third-party applications that may be enough to convince a buyer to go with NetView instead of another product with fewer applications.

If that's not the case, though, and open features are the primary objective, buyers should be prepared to examine existing offerings by taking into account all the factors that will ultimately enable them to make informed buying decisions.

Only then will network managers be assured they no longer have to bounce between management systems. ■

Letters

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face for Channelink extenders" (*NW,* May 4) said that Network Systems Corp. customers have to operate two separate networks for direct-access storage device (DASD) and other channel extension applications. As Wayne and Garth would say, "NOT!"

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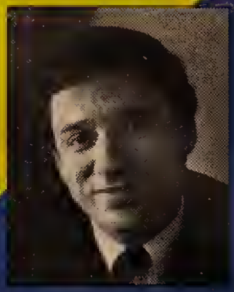
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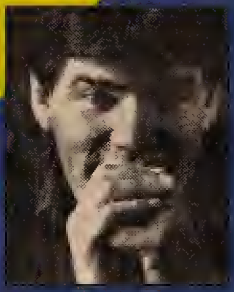
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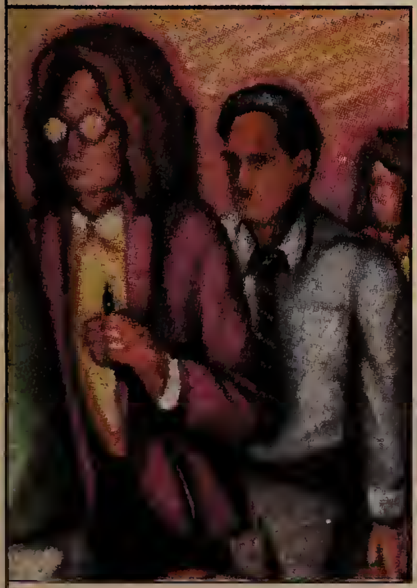
CRITICAL ISSUES FACING USERS

Sizing up the most critical issues

By SAL SALAMONE

Interoperability, cost and staffing top the list of critical issues that keep net managers searching for creative solutions.

For many network managers, it must seem as if there is no end to the problems they face in keeping their nets running and their end users satisfied. Listening to vendors and upper management urging them to do this or not do that can be straining. Compounding network managers' agony is the pressure of worrying whether products will interoperate or a technology will become obsolete soon after it is purchased.



While it is enough to drive anyone over the edge, what's worse is that it is not all that unusual. Network managers deal with this type of situation day in and day out but somehow always survive. While the specific problems they face vary, the root of these problems can be traced to a common set of critical issues.

The most critical issues facing users today are compatibility and interoperability, containing costs and the need for better network management tools, according to *Network World's* latest "Critical Issues Facing Users" survey.

The survey asked 150 network managers to identify the three most critical issues they face today. The 10 most frequently mentioned issues appear in the graphic on page 65.

Respondents' duties cut across all functional networking areas, with most being responsible for enterprisewide local-area network, voice and data management (see graphic, page 69).

The top issue

Many survey respondents say linking departmental LANs to mainframe resident databases represented a major challenge. Making the physical connection between the two is difficult, but getting the software on the LAN and mainframe to work together is a real bear, many maintain.

"None of it is compatible," says Lynn Kavelman, manager of information systems at the *Peoria (Ill.) Journal Star* daily newspaper. "It's difficult, time consuming and expensive to marry the two."

Many other respondents share that assessment. For instance, several of them point out that getting even a simple application, such as electronic mail, to work across different network operating systems and hardware platforms required a lot of time and effort.

Some network managers included compatibility in their interoperability concerns. Separating compatibility from interoperability may seem to be a matter of semantics, but net managers generally discussed that issue when citing problems with getting applications to work together.

Specifically, several respondents say they often found a lack of compatibility between hardware and software. Many network managers noted they have had difficulties getting Microsoft Corp.'s Windows to run on LANs because of memory allocation conflicts between Windows and network interface cards (NIC).

Most network managers find the interoperability issue is so important that it is part of their planning process. "Interoperability is a big issue when [you're] trying to develop a strategy for distributed environments," says Tom Fermazin, a telecommunications specialist at Amoco Corp. in Chicago.

Fermazin notes that interoperability of products with existing equipment is a major factor in any purchasing decision.

Most managers must work with networks they have inherited. Thus, rather than starting

(continued on page 65)

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(continued from page 63)

from scratch, they're forced to meld new equipment with existing gear.

Many also think that selecting products that are touted as standards-compliant ensures that the equipment will work together. But according to some respondents, this is not always the case.

Network managers blame the inability of standards to fulfill their promise on vendor apathy toward supporting standards and the looseness of many of their implementations. For example, several net managers say they've found that vendors implement the same standard in different ways. So while their products technically comply with the standard, they often won't work with one another.

Cost issues

Following interoperability and its related issues, cost was the second most commonly cited user concern. "Balancing dollars to vendors is the key issue," says Gerry Harrington, a telecommunications manager at Valley Systems, Inc. in Milwaukee who, like most network managers, has a limited budget for purchasing networking equipment.

Network managers' top concerns

① Compatibility and interoperability
② Cost
③ Lack of net management tools
④ Managing staff
⑤ Product reliability and performance
⑥ Network availability and keeping systems running
⑦ Service and technical support
⑧ Standards
⑨ Keeping up with technology
⑩ Training end users

SOURCE: *NETWORK WORLD*
GRAPHIC BY SUSAN SLATER

Managers can find a solution to almost any networking problem if they have the money. Need more bandwidth? A 100M bit/sec Fiber Distributed Data Interface network could provide more than enough, but it will it come at a high price.

T-1 lines not carrying wide-area traffic loads fast enough? T-3s are available, but again, the cost may cause many managers to make do with the lower priced T-1s.

Network managers noted that some low-end products, such as NICs, have dropped in price over the past year, thus lowering the cost of buying into certain technologies such as 10Base-T.

However, some complain they cannot benefit from those price drops because of constrained budgets that have slowed the rate of capital equipment purchases.

Besides hardware expenditures, several respondents say the cost of running their nets increased last year and these expenses were getting out of hand. For example, there is a trend to tie remote LANs to other sites by building LAN internetworks, resulting in many smaller companies paying for circuits they never needed before.

Some companies are trying to save money by combining voice and data traffic over the same circuit that links the remote sites. But this requires the purchase of additional equipment, which postpones the benefit of reduced circuit costs until after the capital expense has been paid off.

New management tools

Network managers in companies linking remote LANs are also finding they need new and better management tools, just as their counterparts in companies with other forms of wide-area networks for data have found existing network management tools lacking in some respects.

"The network management tools always seem to lag behind the new technologies," says a network manager at a San Francisco financial brokerage house who requested anonymity. For instance, many LAN hubs were initially sold as dumb devices and optional network management was only offered after the fact.

Others pointed to the lack of monitoring and diagnostic functions in many network management tools. They want some type of monitoring function and problem identification features added to existing net management tools. Several respondents say that as their networks expand, they need better net management tools to help them keep track of what's occurring at isolated sites and provide better ties between existing element management systems and integrated enterprisewide net management systems.

One of the reasons net managers are concerned about network management is because many companies have lights-out networking, which involves remote sites with no staff. Improved network manage-

(continued on page 69)

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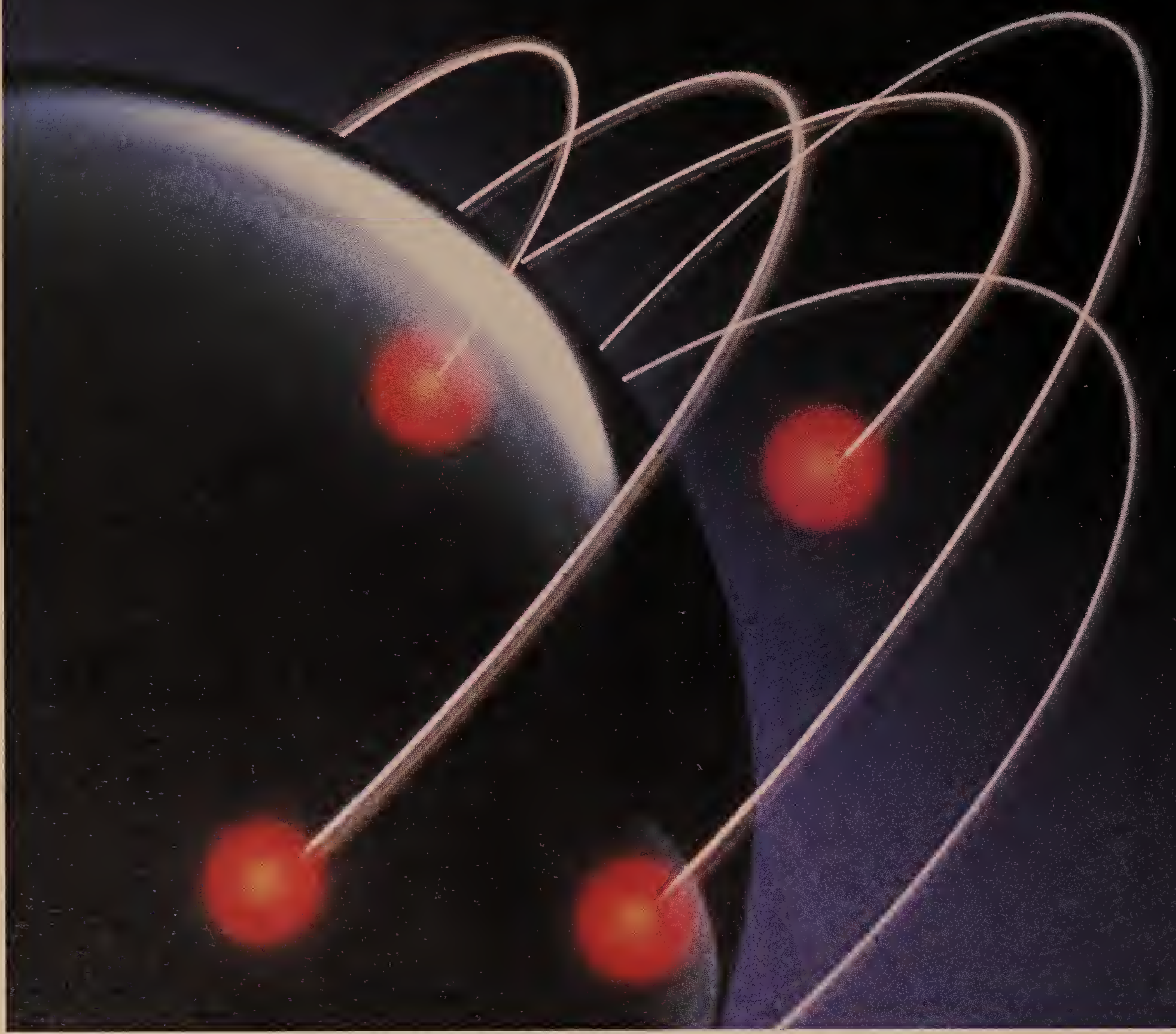

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(continued from page 65)

ment tools that provide remote diagnostic capabilities are desirable in such situations. They can be enough to prevent sending a technician to the site when repairs are needed.

Managing staff

The growing trend to tie remote site management into a central location is related to the cost issue; many network managers are being forced to tighten budgets. Often, staffs at remote sites as well as headquarters have been trimmed and those remaining are forced to do more work, making the sites difficult to manage.

"We've had too many staff reductions," says a network manager of a federal agency who requested anonymity. "Tight budgets, early retirements and a hiring freeze inspired by election-year politics have cut our staff to the point where we spend all our time just keeping the network running. We have no time to improve the network."

Some managers have another type of staff management problem: They can't find enough skilled workers. According to Jeffrey Lipton, director of office support and telecommunication services at the University of Colorado in Boulder, he has found that the pool of skilled workers in some specialty areas is small.

Many firms migrating from older style mainframe technologies to distributed personal computer LANs can't find the right application programmers and net personnel to handle the transition. To solve this problem, Lipton says he often must hire those without the required skills and let them learn on the job.

"We might take someone with a moderate electronics background and through on-the-job training, direct that person into the telecom and data communications environments," he explains.

Product performance

Besides having a problem finding skilled staffers, survey respondents say they often cannot find products that meet their performance needs.

For example, Lipton says he couldn't find a telemanagement software package that would perform the functions his school required. When shopping around, he found that most of the products on the market were based on old technologies that he thought would be outdated soon. He decided the university would be better off writing its own telemanagement package from scratch.

And that's what it did. The telemanagement system is operational and performs the tasks the school requires.

When off-the-shelf packages that perform needed functions are found, network managers complain that they have to deal with software bugs, which require them to hound vendors for the many patches needed to get the software to work properly.

For example, respondents say some vendors ship numerous upgrades and new versions of their software packages to address deficiencies in the original product.

The frequent software updates cause several problems. First, many programs lack network distribution features and force net managers and their staff to manually load the software onto every workstation, which takes considerable time. Secondly, end users must be retrained if the new program has different features.

And finally, new programs often do not work with existing equipment without some modification. For example, many times a program that accesses a printer will require the loading of a new printer driver before a document can be printed.

Network availability

If all this were not enough, network managers also spend many sleepless nights worrying about decreasing network downtime that often occurs when equipment fails or refuses to work with another device. Some of the problems introduced by faulty or incompatible equipment are minor. For example, a device may simply need to be reconfigured. However, sometimes the results can be much worse and manifest themselves in lapses of network availability.

Most survey respondents say their corporations rely on the nets being up all the time. Any downtime results in lost productivity as idle employees wait to access network resources.

Many net managers are responsible for wide-area communications, and the wide-area connection adds to the downtime issue's importance. "We have a problem with our T-1s going down too often," says Gary Rogers, engineering supervisor at Singer Electronic Systems.

Network failures, such as unreliable T-1 circuits, have led network managers to change the way they manage their nets. Several say they have taken a more proactive role in monitoring network conditions in order to avoid downtime. Many have built redundant paths so they can divert traffic if a piece of equipment, such as a bridge or router, fails or if a circuit goes down.

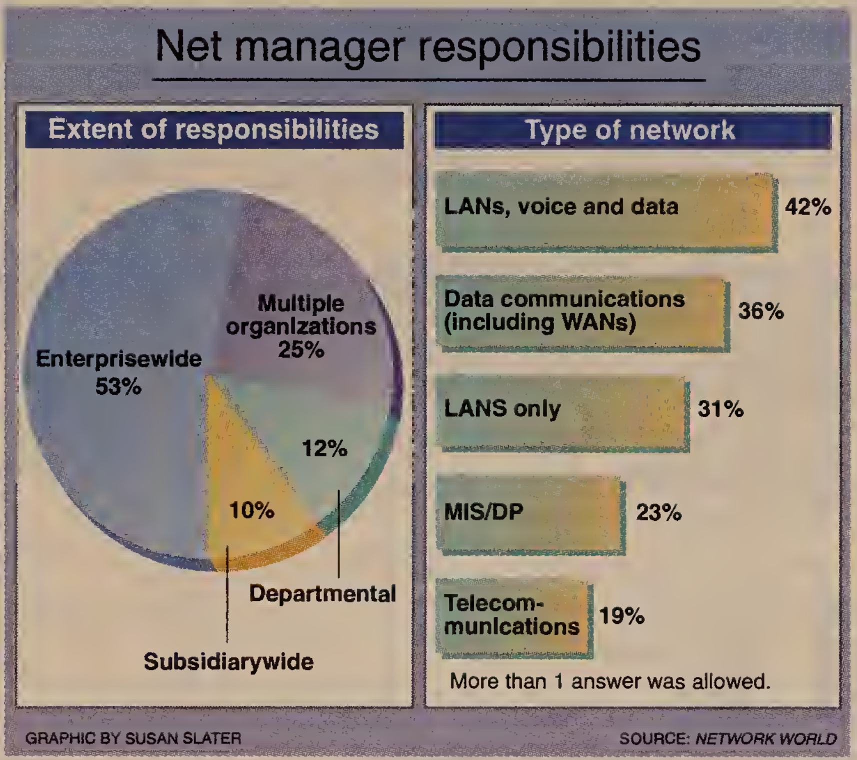
Service and support

Taking a more proactive role in monitoring the net often helps identify faulty equipment before it degrades net performance or brings the net down. Once identified, this equipment can be bypassed or repaired.

However, managers who try to correct or repair faulty equipment are not receiving the necessary technical support from vendors.

Survey respondents note that after making a purchase, they often find that the technical support offered from vendors is not always up to the level they had expected.

"Service is very uneven," says Susan Farrar, director of academic computing services at Collin County Community College in Plano, Texas.



Net manager responsibilities

Extent of responsibilities

Type of network

More than 1 answer was allowed.

GRAPHIC BY SUSAN SLATER

SOURCE: *NETWORK WORLD*

Some vendors have technical support personnel who can answer questions and troubleshoot a problem instantly via telephone. Other vendors simply take down the information, discuss it with support personnel and then call back the network manager with an answer.

Farrar cites WordPerfect Corp. as one of the vendor that's best at answering questions and solving problems. However, she says many others are just not delivering the kind of service she needs.

For many network managers, the reason that they call a vendor's technical support center or hot line is to handle a crisis. Something does not work, and angry end users want it fixed as soon as possible. Yet many technical support centers force network managers to remain on hold in endless telephone queues before their questions are answered.

Ironically, some managers prefer waiting on hold compared to the alternatives.

"My worse nightmare is phone mail," Farrar says.

For example, many hot lines take the net manager's name and phone number, promising to return the call. The problem with a system like that is network managers are seldom at their desk when the call is returned, Farrar says.

Even when the connection to the technical support staff is established, the results are often less than satisfactory and has led many managers to investigate a vendor's technical support record before buying a product from them.

Such an investigation was an important factor in a New York financial brokerage firm's decision to buy workstations from Compaq Computer Corp. instead of Gateway 2000, Ltd., a mail-order business.

"We did not choose [Gateway's] product based on the company's bad service history," says the firm's network manager, who requested anonymity.

Other issues

Another factor adding to the burden of network managers selecting vendors and products is the rapid rate at which new technologies are rolled out. Managers need to understand new technologies before they can make an intelligent purchasing decision.

But keeping abreast of new technical developments is a time-consuming and difficult task. Some net managers must keep up with new technologies in order to map out their company's network strategy, while others simply must do so because of the financial savings new services and equipment can bring them.

"We are driven by economics and by the need to make a connection, such as linking buildings or connecting to outside services," says Dorothy Mulligan, coordinator of academic computing and educational technology at Jersey City State College in New Jersey.

In order to do this, Mulligan has to keep current on new technologies. For example, she learned about the capabilities of Integrated Services Digital Network circuits when investigating how to establish a videoconference link between classrooms in two cities.

Even though ISDN was not available in her area, Mulligan purchased videoconferencing equipment that supported interfaces to ISDN circuits as well as to digital leased lines. She used leased lines to support the video link initally. When ISDN service became available, she simply switched from the expensive leased lines to more economical ISDN Basic Rate Interface circuits.

Several network managers say tight budgets were forcing them to curtail their explorations of new technologies. This is done in differently at various companies.

Some managers, for example, say staff reductions forced them to do more with less, and one area that got short shrift was new technology exploration. This has forced some firms to limit the number of new technologies they investigate each year.

Still others say they had to trim their educational budgets so much that they can no longer afford to send staff to as many training seminars or conferences as they have in the past, thus limiting their ability to keep up with the latest technology.

Keeping up-to-date on new technologies is not restricted to networking staff. Many managers must train their end users to use new technologies.

"We need to have additional staff just to help train our end users," says Collin County Community College's Farrar, who finds end-user training critical. "For users to take advantage of all the technology we spend money on, we need to train them."

These duties just add to a network manager's job. That's why many seem to think their job never ends. They are in a rapidly changing industry with vry few guidelines. Of those that do exist, the majority are tilted toward learning to cope with the ever-shifting demands placed on network managers by varying constituencies.

End users want products that work together, not excuses for why they do not. Upper management wants to see bottom-line reductions in network operating costs, not skyrocketing expenditures for technology that's obsolete soon after it is installed. Network staff cries for management tools that will help them perform their jobs better.

Network managers are besieged with these and other critical issues every day and are striving to deal with them in original ways. ◪

Salamone is Network World's *features writer.*

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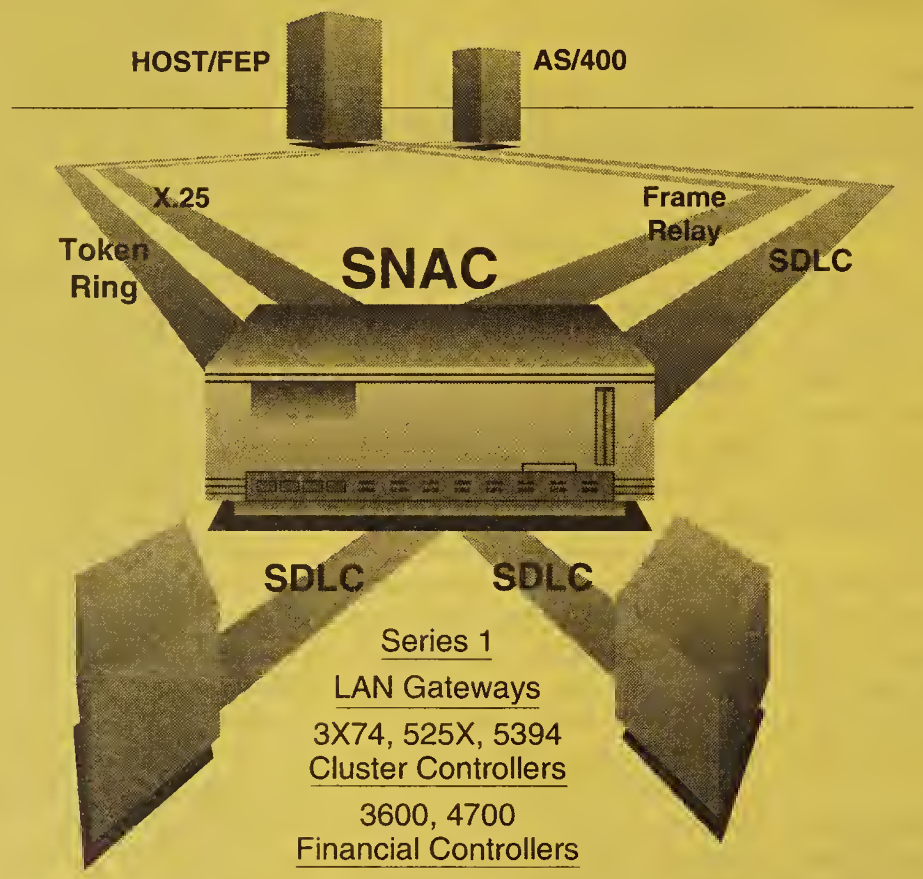

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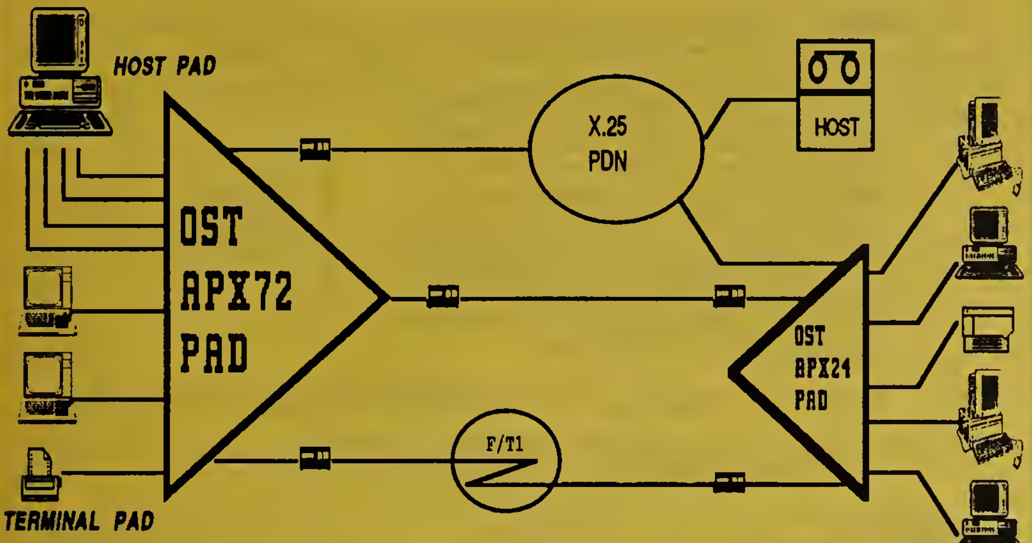

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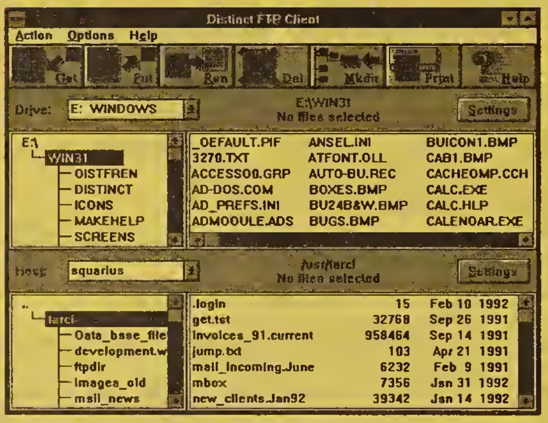

```
Drive: E: WINDOWS          E:\WIN31
                           No files selected
E:\
└WIN31
  ├OISTFREN       _OEFAULT.PIF    ANSEL.INI      BUICON1.BMP
  ├DISTINCT       3270.TXT        ATFONT.OLL     CAB1.BMP
  ├ICONS          ACCESSO0.GRP    AUTO-BU.REC    CACHEOMP.CCH
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Host: squarius             /usr/tarci
                           No files selected
..
└tarci
  ├Oata_bsse_file    .login                   15   Feb 10 1992
  ├development.w     get.tst               32768   Sep 26 1991
  ├ftpdir            Invoices_91.current  958464   Sep 14 1991
  ├Imagea_old        jump.txt                103   Apr 21 1991
  └mall_news         mall_Incoming.June     6232   Feb  9 1991
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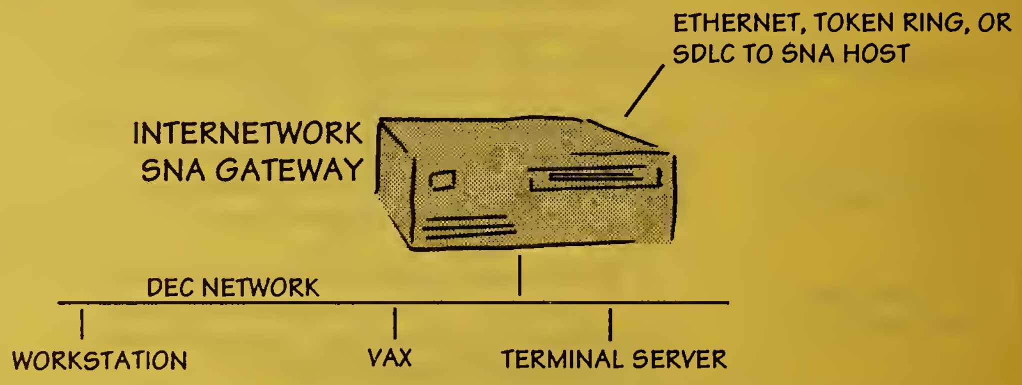

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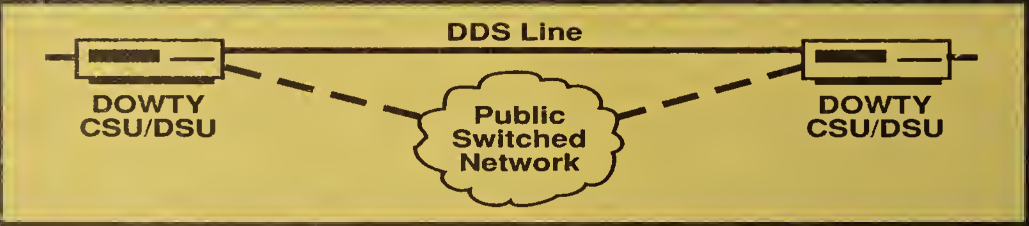

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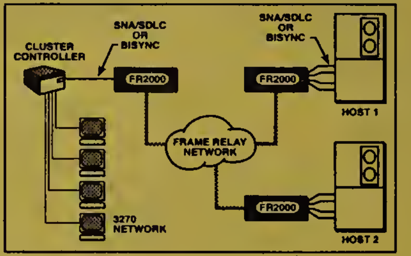

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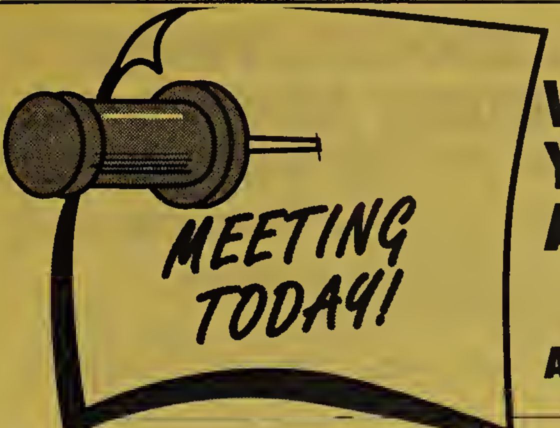
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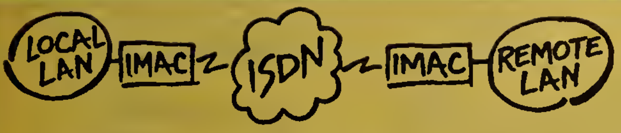

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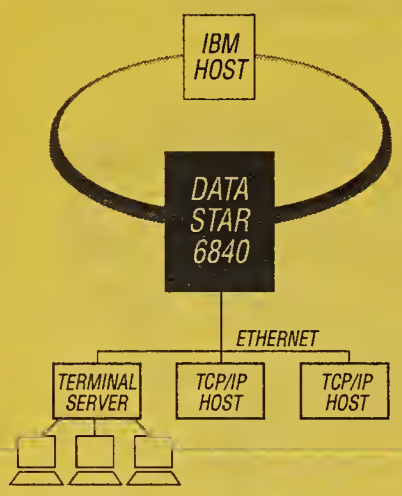

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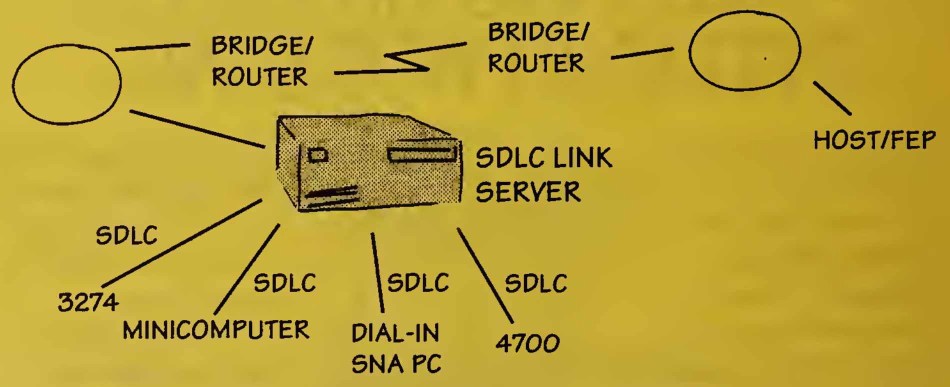

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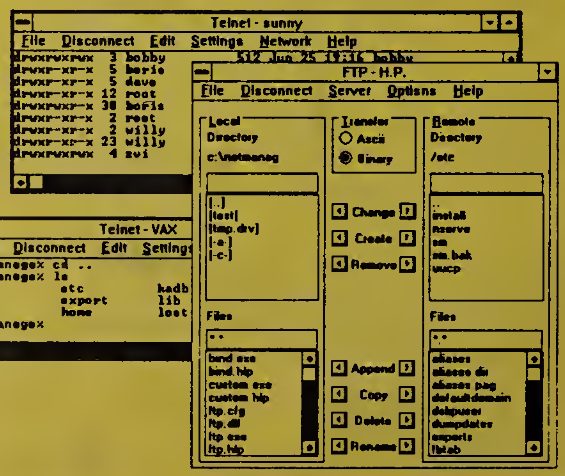

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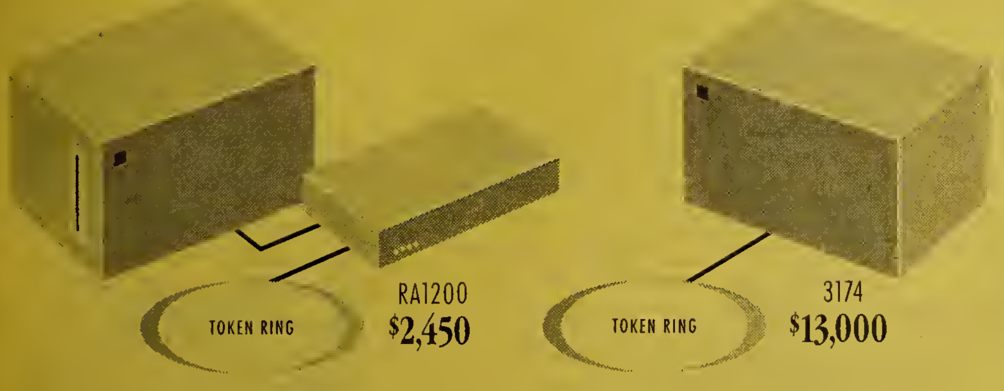

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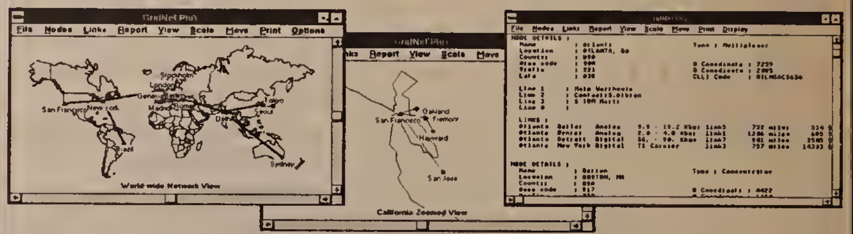

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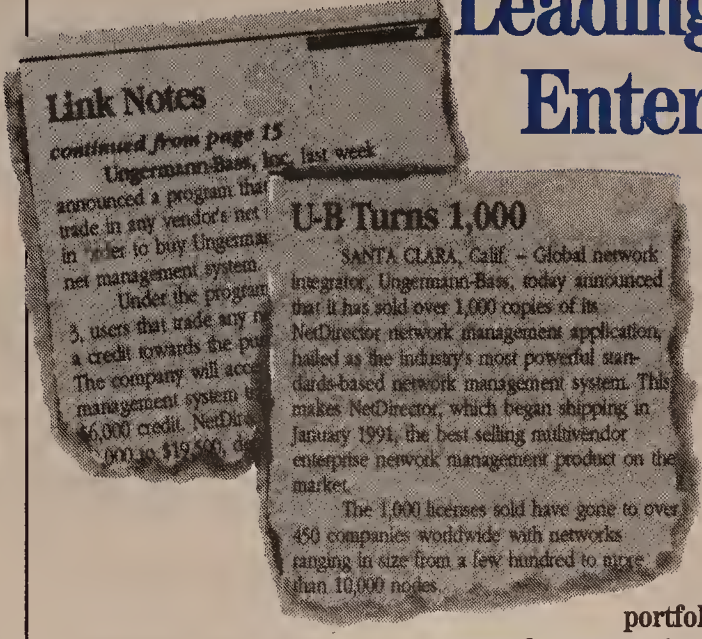

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continued from page 15

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AT&T matches toll fraud protection plan

continued from page 2

voice mail systems and using stolen authorization codes to place unauthorized calls. Annual toll fraud costs U.S. corporations an estimated $1 billion.

Free surveillance

Under NetProtect, AT&T will monitor 800-service calling patterns 24 hours a day, seven days a week free of charge and "attempt" to alert users of suspicious calls. Beginning in August, it will offer the same coverage for international calls.

The carrier will use algorithms based on normal traffic patterns submitted by users to detect suspicious calling patterns and other unusual activity, such as high call volumes to specific area codes and sudden peaks in 800 calls at odd times.

Customers can also pay for two higher levels of fraud monitoring. NetProtect Enhanced Service allows users to customize AT&T's monitoring profile to catch suspicious calls and caps user liability at $25,000 per incident.

Joe Nacchio, president of AT&T's Business Communications Services group, said if a user detects fraud before AT&T, the cap will be reduced to $12,500.

The highest level of protection is the NetProtect Premium Service, which exempts users from fraud charges incurred within two hours of being notified by AT&T of fraud activity. If customers fail to stop the fraud they are liabile for damages up to $25,000 after the two hours.

Both offerings require users to adhere to AT&T security measures.

Service pricing will not be revealed until tariffs are filed next month.

Other safeguards

In addition to the network monitoring services offered under NetProtect, AT&T is also enhancing the network management capabilities of its Software-Defined Network service to enable customers to monitor calls on a real-time basis. This feature, which should help SDN users prevent toll fraud, will be available on a limited basis in July for $1,475 per month.

AT&T also rolled out a new software package dubbed Hacker Tracker, which works with AT&T's PBX Call Accounting System Plus to detect and alert users to suspicious calling patterns. Customers input different calling pattern limits and, when exceeded, the PBX sends an alarm to the operator. The software will be available June 1 for $1,995 per PBX.

The carrier is also unveiling the Security Audit Service, which is an on-site consulting service to help companies identify and minimize security risks, and the AT&T Fraud Intervention Service, which allows users to contact AT&T experts over the telephone for help with toll fraud problems. The service is available now at $150 per hour. ☑

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SunConnect preps SunNet Manager 2.0

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SunNet Manager, including plans to port the Simple Network Management Protocol-based system to other Unix hardware platforms, such as Intel Corp. 80X86-based personal computers, IBM's RISC System/6000 workstations and HP's 9000 series computers.

Today, the product runs on the company's Unix-based SPARCstations and SPARCservers.

SunConnect has also pledged support for Novell, Inc. NetWare nets via either a SunConnect or third-party product and

(continued on page 86)

AT&T offers frame relay network mgmt.

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col/Internet Protocol or Digital Equipment Corp. DECnet local-area networks. AT&T is considering including support for additional protocols, Field said.

Technicians at the center can access a customer's router to view traffic statistics or check its configuration.

The testing is primarily conducted using an inband technique, Field said, but if the frame relay link is down, the management system at the center dials up a modem and performs any necessary tests.

AT&T is trying to make its InterSpan service less expensive by leasing customer premises equipment to its customers.

Paul Rosenbaum, AT&T's Extended Connectivity Option product manager, said the carrier will initially provide Cisco Systems, Inc. routers with the service.

The Extended Connectivity Option is currently in controlled introduction and will be generally available in the fourth quarter of this year. ☑

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Circle Reader Service #117

Apple set to take Mac down OSI path

continued from page 1

functions associated with E-mail servers. The most basic MTA can store and forward messages and maintain an address directory. Unlike most other E-mail systems, X.400 requires an MTA in gateways as well as servers.

X.400 gateways based on Apple's MTA are expected to be announced concurrently at the show for the two most popular Macintosh E-mail packages, CE Software, Inc.'s QuickMail and Microsoft Corp.'s MSMail.

For users that do not want to dedicate an expensive Macintosh as an X.400 gateway, Los Angeles-based Isocor gateways — X.400 Lite, for personal computers, and Isoplex X.400, for PCs and IBM RISC System/6000s — will work with Apple's engine.

According to sources, several European developers are also working to create X.400 clients that use the MTA as an E-mail server that will not require gateways in order to communicate with other X.400 systems. OSI and, consequently, X.400 are more widely used in Europe, where communications standards are mandated by governments and more critical for international trade.

Based on the 1984 X.400 specification, the MTA has been under development in Apple's Paris office for about three years now and has no ties to the company's more recently developed Open Collaboration Environment (OCE), a set of system-level services that revolve around messaging.

However, sources said Apple will eventually port the MTA to run as a module under OCE's service provider interface and may provide an interim link between the X.400 MTA and OCE.

According to sources, the MTA will support Apple's AppleTalk and X.25 connections through MacX25, the only OSI product the vendor has delivered since announcing OSI support in 1989.

Apple representatives were unavailable for comment.

As the most commonly used protocol on public packet networks, X.25 support will not only provide connections to large X.400 E-mail services, such as Sprint Corp.'s SprintMail, but will also let organizations create their own companywide E-mail net.

The Macintosh OSI protocol stack, due in the second half of this year in a developer's kit, will offer only the underlying OSI network protocols. Apple is relying on third parties to make the stack useful by offering such services as File Transfer, Access and Management (FTAM).

Apple's ODA software, also expected later this year, will work with the stack to format Macintosh documents into the OSI-specified format for electronically transmitted documents. ODA is an OSI standard intended to make it easier for users on different vendors' systems to exchange compound documents, which may include text, graphics and images. ◻

Apple CEO says networking is key to success

SAN JOSE, Calif. — It's a bit early in the morning for most of the programmers here, but they've filled a cavernous auditorium to hear John Sculley, Apple Computer, Inc. chief executive officer, tell them the future of the Macintosh — and Apple — is in networking and communications.

Speaking at Apple's worldwide developer's conference here, Sculley touted the company's upcoming Open Collaboration Toolbox, AppleScript and graphics and video technologies designed to make connecting applications and users not only easy but pervasive.

The Open Collaboration Toolbox is a set of system-level services that let developers build message-enabled applications. AppleScript will let users write executable scripts that can control a variety of applications across the network. Both are due later this year.

"Most people think of the Macintosh as easy to use," said Sculley.

With these technologies, he wants people to think of the Macintosh as easy to connect and easy to get to collaborate with other net resources.

According to Sculley, the telecommunications market will ring up $1.1 trillion in sales by the year 2000. He urged Macintosh developers to join him in taking a bite out of this enormous pie.

— *Margie Wylie*

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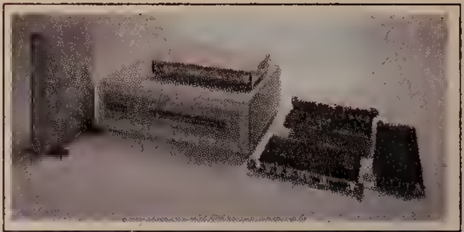

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Circle Reader Service #105

Quality Is Fundamental

SunConnect preps SunNet Manager 2.0

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promised to make a statement later this year regarding Open Systems Interconnection management.

The enhanced version, new partnerships and expanded platform support are designed to better position SunNet Manager as an enterprise manager, said Denis Yaro, SunConnect's director of network management.

"SunNet Manager is much more than a departmental or subdomain management system," said Yaro, who claimed that many users, including The Boeing Co., are standardizing on SunNet Manager as an enterprise net management platform.

One question that has plagued SunNet Manager has been whether the product is capable of managing large networks. Yaro said SunNet Manager 2.0 addresses this issue head-on with improvements that allow it to manage tens of thousands of net nodes, an increase from thousands of nodes in previous versions.

SunNet Manager has a distributed architecture that allows its agents running on workstations to control various subnetworks, such as a Digital Equipment Corp. DecNet, and feed data to a central SunNet Manager station.

SunConnect has improved the capabilities of the SunNet Manager agents to poll more nodes and collect more data on the subnetworks they oversee. The central SunNet Manager station has been enhanced to handle more data from the agents and more transactions with them.

Robb Newman, a consultant with Northwest Airlines, Inc. in St. Paul, Minn., said the performance boost for SunNet Manager is welcome news. The airline bought SunNet Manager to use as an enterprise management system but found the product inadequate for managing a large network. It scaled back deployment of SunNet Manager to use as a divisional network manager but now is reconsidering expanding SunNet Manager to support a possible new companywide net application, he said.

SunConnect has also made SunNet Manager easier to use, said Brian Craig, SunConnect's product-line marketing manager for network management.

A new feature dubbed Auto-Management lets users start managing their networks as soon as they load SunNet Manager 2.0 on a workstation, Craig said. The enhancement works with a feature called Auto Discovery, which automatically identifies Internet Protocol nodes on a Transmission Control Protocol/Internet Protocol net.

Another new feature, called Request Viewer, lets users call up a window offering a single view of all active management queries, known as requests. Requests include polling net devices to monitor throughput and setting thresholds.

SunNet Manager 2.0 also features a new facility that makes it easier for users to set system defaults. Administrators can apply the same defaults for each management application in use.

SunNet Manager 2.0 will be available in July and priced at $3,995. SunConnect will offer a limited upgrade deal of $495 for some users moving from Version 1.2 to 2.0, but the standard upgrade price is $1,795.

Thirty-five new development and distribution partners have signed onto SunConnect's Partners Program for Network Management, which now boasts 68 members. New partners include Cabletron Systems, Inc., Chipcom Corp. and Information Presentation Technology, which has an application dubbed Apple AgentMan that lets SunNet Manager control Apple Computer, Inc. AppleTalk nets. ◻

IBM leads rush to new FDDI spec

continued from page 1

"All this confusion is going to drive users crazy," said Charles Robbins, director of communications research at Aberdeen Group, Inc., a consultancy based in Boston. "Users need a single shielded twisted-pair standard to evolve."

A bit of history

Only one year ago, Advanced Micro Devices, Inc., Chipcom, Digital Equipment Corp., Motorola and SynOptics — also known as "The Gang of Five" — proposed a specification for FDDI over shielded twisted pair to the ANSI committee. This proposal, which came to be known as the "green book" specification, included methodology for workstation-to-hub connections.

At about the same time, IBM submitted a proposal for FDDI over shielded twisted pair that allowed workstation-to-workstation and workstation-to-hub connectivity. ANSI suggested the two sides come up with a unified standard.

The merged specification — SDDI — was presented to the committee in October. However, the committee decided a single standard for transmitting FDDI over both shielded and unshielded twisted-pair cabling would be more beneficial to users, so the SDDI proposal was rejected.

But IBM and the other participating companies did not want to wait for the new combined standard, so they decided to set the wheels in motion themselves.

"The standards committee has been looking at a single standard to work with both [unshielded] and shielded twisted pair, but that will take time," said Franc Noel, manager of FDDI hardware development at IBM's Research Triangle Park, N.C., facility. "The interface we're talking about is here today; companies can build to this interface today."

And IBM has already built to the specification. Noel confirmed that IBM will release SDDI-based products here this week at INTEROP 92 Spring, although he would not specify what types of products would be announced.

Other companies, too, have pledged to bring out SDDI-based products.

"We'll offer an SDDI concentrator and a host module for the concentrator that should be available by the third quarter [of this year]," said Jim Vogt, product manager for FDDI connectivity at SynOptics, based in Santa Clara, Calif.

Although some companies, such as DEC, said they will not build SDDI-compliant products because SDDI is not a standard, observers agreed the clout these companies carry may spur the acceptance of SDDI.

"I think IBM's support is critical. It's hard to believe that [FDDI over shielded twisted pair] would gain widespread acceptance without it," said Jamie Warter, FDDI product manager at Chipcom, based in Southborough, Mass.

With this much backing, only one problem remains. Companies such as SynOptics and DEC had already released products conforming to the green book specifications. Users, therefore, will have to choose between two sets of products that provide the same FDDI over shielded twisted-pair capabilities.

In some cases, these products may even come from the same company. SynOptics, for example, will offer products conforming to both specifications. ◻

Staff Writer Skip MacAskill contributed to this story.

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Second-class postage paid at Framingham, Mass., and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

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Users, carriers team for trial

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vices, said the carrier wants to explore technical and operational aspects of SDMS, including network and equipment performance, congestion, billing and trouble isolation. "Ultimately, the goal is to deliver a service, but it would be premature to assess when that would be," she said.

At least four of the regional Bell holding companies have announced SMDS plans. Pacific Bell plans to file a tariff for SMDS this summer and roll out the service in the fall.

GTE will officially unveil its SMDS rollout plans at the International Communications Association conference in Atlanta this week. GTE and Pacific Bell have been jointly testing a local SMDS service since last September.

> "With intra-LATA, you can buy high-speed transmission fairly cheap," Ramey said.
>
> ▲▲▲

Chuck Ramey, manager of telecommunications network hardware at Rockwell Information Systems Center, said his firm just completed an intra-local access and transport area SMDS trial with GTE and Pacific Bell but was eager to participate in the long-distance trial because that is where SMDS offers the most value for customers.

"[With] intra-LATA, you can buy high-speed transmission fairly cheap," he said. "In inter-LATA, depending on distances, it can get quite expensive."

Rockwell Information Systems Center has two 56K bit/sec digital private lines over which it shares information with NASA. Ramey said the firm will be looking at whether SMDS might be more cost-effective. SMDS may also serve sites that otherwise would not be able to afford high-speed transmission.

NASA is also interested in evaluating SMDS as a means to expand network capacity and keep costs in line, said Jim McCabe, acting long-haul manager of NASA's Numerical Aerodynamics Simulation Program. NASA is currently conducting scientific modeling on a distributed basis, where a supercomputer handles number crunching, and data is sent to workstations, which handle visualization.

Such applications require high bandwidth but only for a limited duration. SMDS would allow numerous employees to share a common facility and utilize idle transmission periods.

All three carriers will use AT&T Network Systems' Broadband Networking Switch-2000 cell relay switch since interfaces that allow different vendors' switches to interoperate are not available yet. But the two users will test interoperability among routers from Cisco Systems, Inc., Kentrox Industries, Inc. and Wellfleet Communications, Inc.

SMDS will provide connections from a Cray Research, Inc. supercomputer and an Ethernet LAN at the NASA site to a Cray supercomputer at the Rockwell Information Systems in Seal Beach, Calif., and an Ethernet at Rockwell Rocketdyne Division in Canoga Park, Calif. The supercomputers will share data used in a graphical fluid dynamics application. Sun Microsystems, Inc. workstations on the Ethernets will exchange data over SMDS.

Pacific Bell and GTE will provide SMDS access links, and AT&T will provide a long-distance SMDS circuit between Los Angeles and San Francisco. Applications will run at T-1 speed initially, but T-3 may be tested if T-3 line cards are available.

IBM defends SystemView strategy

continued from page 8

still placing too much emphasis on the mainframe area."

IBM needs to treat LAN systems as it would its MVS or VM platforms, Dolbec continued.

"We've had to develop a lot of the applications to do what we've needed to do, [but] I don't want to be in the software development business," he said.

Users at Bankers Trust Co. in New York are more optimistic about SystemView's prospects and are looking to SystemView products to help reengineer their data center.

"We want to automate as much as possible," said Warren Ousley, senior vice-president of Bankers Trust. "Our networks and LANs are our next priority, and we want the SystemView products to help us manage our complicated environment."

For others, SystemView could use a little more fact instead of fiction.

"It's difficult to see how IBM could support the many different things users want under one systems management platform," said Tom Nolle, president of CIMI Corp., a consultancy in Voorhees, N.J.

Net/Master for Tandem to debut

continued from page 6

ter's Network Control Language, users can write applications to gather net management information and automate commands or responses to problems on their networks.

"The way we sent network management information to NetView in the past was very restrictive and not as flexible or sophisticated as these new products," said Michael Matthews, vice-president of strategic marketing at Systems Center.

"With Tandem's fault-tolerant [on-line transaction processing] systems, automation routines bring networks back up quicker, improving service to their users," he added.

So far, beta users have given the product passing marks. One user, Caltex Oil Proprietary, Ltd. in Sydney, Australia, previously did not have a net management system for its 1,000-terminal Tandem network.

"We were looking for a network management product that would provide a centralized control point and a single application development language, and so far, this product has met those two requirements," a Caltex spokesman said.

Analysts said that while the Tandem-Systems Center software is initially aimed at better integrating Tandem computers in SNA nets, it could be expanded in the future.

"The products provide a high-level, integrated systems management tool for Tandem-SNA users," said Chris Christianson, research director for commercial systems at International Data Corp. in Framingham, Mass. "It lacks support for SNMP devices, like routers, but Systems Center will fix that in the future."

NonStop Net/Master will be available in August starting at $9,620. SOLVE:Connect will be available in the second half of the year. Pricing has not been set.

Software aids hub net mgmt.

continued from page 2

etary management platform — its Network Control Server — to offering applications built to run on an open platform.

Analysts said the move to an open platform was inevitable and driven by customer demand. It also benefits 3Com because it is less costly to develop open applications tuned for its products than to build and enhance an entire management platform such as SunNet Manager.

"It's more efficient for the whole industry, and users benefit," said Michael Howard, president of Infonetics Research, Inc. in San Jose, Calif.

The ViewBuilder/Unix line comprises NetBuilder Management for NetBuilder bridge/routers, LinkBuilder 3GH Management for 3Com's third-generation LinkBuilder hub and Remote Boot and Configuration Services (RBCS) Version 2.0.

Once installed, NetBuilder Management automatically feeds information on bridge/routers into the database and SunNet Manager's graphical network map, allowing administrators to control these devices from the platform's interface.

The product includes performance monitors that display port traffic grouped by protocol and a report writer that helps analyze network planning and troubleshooting. The application can be used to configure such device parameters as name, Internet Protocol address and interface information.

"It was very easy to install; you didn't have to be a Unix guru to make it work properly," said Mike Baber, an information systems analyst for Ericsson GE Mobile Communications in Lynchburg, Va., a beta-test site for NetBuilder Management. "You look at the screen and know what you have on the net. It also lets you log in to the box from the SunNet Manager console and configure or set parameters."

INTEROP

LinkBuilder 3GH Management provides a set of management tools for the LinkBuilder 3GH hub, which supports Ethernet and Fiber Distributed Data Interface connections. It provides a graphical view of the hub, including LEDs and modules, and an internal view of all Ethernet LAN Modules (ELM) attached to the primary or secondary FDDI backplane.

The offering also features extensive FDDI management capabilities, including real-time mapping of all FDDI-attached objects and a graphical display of Station Management Protocol 6.2 management information.

The enhanced RBCS 2.0 allows the user to enable or disable a 3Com bridge/router or hub from the management console as well as download new software from a Sun Microsystems, Inc. SPARCstation.

NetBuilder Management is priced at $1,500 and is expected to ship by the end of June. LinkBuilder 3GH Management is also expected to ship next month and costs $5,000. RBCS 2.0 will not be available until this fall, and pricing will be determined at that time.

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In fact, Farallon now has every Ethernet card you'll ever need. Cards for any Mac slot. And any media. Including new 3-way adapters with thick, thin and 10BASE-T ports.

New lower Ethernet prices.

CPU & Features	Price†
Mac II Family (NuBus)	
Thick + Thin + 16K	$249
Thick + 10BASE-T + 16K	$249
3-way + 64K	$329
LC	
Thin + FPU socket	$249
Thin + FPU	$399
10BASE-T + FPU socket	$249
10BASE-T + FPU	$399
Thin + 10BASE-T + FPU socket	$329
Thin + 10BASE-T + FPU	$479
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Thick + Thin + 16K + FPU skt.	$299
Thick + Thin + 16K + FPU	$449
Thick+10BASE-T+16K+FPU skt.	$299
Thick +10BASE-T +16K + FPU	$449
3-way + 64K + FPU socket	$379
3-way + 64K + FPU	$529
SE	
3-way	$329

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Yet although our line expanded, our prices shrank. A lot.

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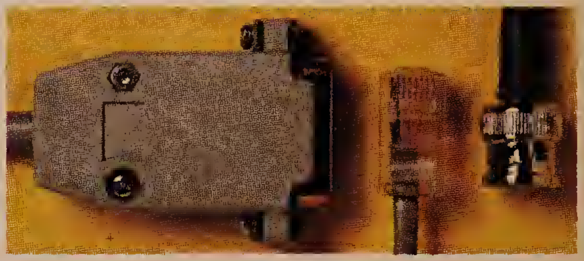

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Circle Reader Service #109

Cast your vote today in our Enterprise Technology Awards!

Dear *Network World* Reader:

Enterprise networks have taken on an increasingly important role in corporations throughout the country. More and more executives are realizing that strategic use of the enterprise network can give their company an edge over its competitors.

But an enterprise network is only as good as the products and services used to build it. Well-designed, interoperable local-area network products, software packages, and wide-area network equipment and services are key to the success of your enterprise network — and your corporation.

That's why *Network World* is pleased to announce our Enterprise Technology Awards. These awards recognize those vendors whose products and services are best designed to work in an enterprise network environment.

To determine the winners, we've chosen a group of eminently qualified people — you, our readers.

Attached to this week's issue is an easy-to-complete survey form listing a variety of product and service categories. In each category, we're asking you to vote for the vendors whose products you feel are most interoperable — those that work best in an enterprise network.

The winners will be featured in a special issue of *Network World,* and the awards will be presented at the INTEROP West conference in San Francisco in October.

If you're missing an entry form, please call us at (800) 622-1108 for more information. **All entries must be submitted by June 19.**

Don't miss this opportunity to voice your opinion on the current crop of enterprise network products and services. Cast your vote today!

Thanks,

Susan Collins

Susan Collins
Associate Features Editor

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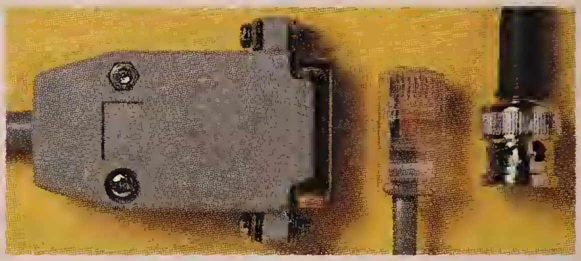

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NETWORK WORLD
The Newsweekly of Enterprise Network Strategies

Each week, *Network World* brings you news about the products and services shaping enterprise networks. Now it's your turn to give us your opinions on these products and services by taking part in *Network World's* first annual Enterprise Technology Awards.

The Enterprise Technology Awards give you the opportunity to vote for the vendors whose products and services work best in an enterprise network environment.

You approve and purchase these products and services. You implement and manage them in an enterprise network. That's why we're asking you to determine which vendors deserve to be acknowledged for their enterprise solutions.

The survey form below lists a range of local-area network products, wide-area network products and services, and network software. Under each category is a list of up to 10 vendor nominees. Nominees were determined based on a combination of market research and input from *Network World* staff and contributors. In addition, a space marked "Other" is provided for write-in candidates.

Under each category, please vote for the one vendor whose products or services you feel are most interoperable, or best designed to work in an enterprise network environment.

When you've finished, please return the survey to us. This form is a prepaid mailer that can be sealed and returned at no expense to you. Alternatively, you may fax your entry to the attention of the Special Projects Editor at (508) 820-3467. (Make sure you fax both sides of the form.)

Please be sure to include your name, title, company name, address and telephone number. All entries must be submitted by Friday, June 19, 1992. Please, only one submission per qualified reader.

After the votes have been tallied, the results will be presented in a featured issue of *Network World*. The awards will be handed out during a special ceremony at INTEROP West in October.

So make your voice heard. Cast your vote in *Network World's* Enterprise Technology Awards today.

Network World 1992 Enterprise Technology Awards

LOCAL-AREA NETWORKS

1. Adapters:

(a) Ethernet:
- ☐Artisoft, Inc.
- ☐Cabletron Systems, Inc.
- ☐Digital Communications Associates, Inc.
- ☐Gateway Communications, Inc.
- ☐Hayes Microcomputer Products, Inc.
- ☐Racal-Datacom, Inc.
- ☐Standard Microsystems Corp./Western Digital Corp.
- ☐Thomas-Conrad Corp.
- ☐3Com Corp.
- ☐Tiara Computer Systems, Inc.
- ☐Other ____________

(b) Token Ring:
- ☐Andrew Corp.
- ☐Digital Communications Associates, Inc.
- ☐IBM
- ☐Madge Networks, Inc.
- ☐Olicom USA, Inc.
- ☐Optical Data Systems, Inc.
- ☐Proteon, Inc.
- ☐Standard Microsystems Corp./Western Digital Corp.
- ☐Thomas-Conrad Corp.
- ☐3Com Corp.
- ☐Other ____________

(c) FDDI:
- ☐Codenoll Technology Corp.
- ☐Digital Equipment Corp.
- ☐Interphase Corp.
- ☐Network Peripherals, Inc.
- ☐Network Systems Corp.
- ☐SBE, Inc.
- ☐Schneider & Koch, Inc.
- ☐Silicon Graphics, Inc.
- ☐Summit Microsystems Corp.
- ☐SysKonnect, Inc.
- ☐Other ____________

2. Bridges:
- ☐Andrew Corp.
- ☐CrossComm Corp.
- ☐Digital Equipment Corp.
- ☐IBM
- ☐Microcom, Inc.
- ☐Newbridge Networks, Inc.
- ☐RAD Network Devices, Inc.
- ☐Retix
- ☐3Com Corp.
- ☐Vitalink Communications Corp.
- ☐Other____________

3. Routers:
- ☐Advanced Computer Communications
- ☐Ascom Timeplex, Inc.
- ☐Cisco Systems, Inc.
- ☐CrossComm Corp.
- ☐Digital Equipment Corp.
- ☐Proteon, Inc.
- ☐Retix
- ☐3Com Corp.
- ☐Vitalink Communications Corp.
- ☐Wellfleet Communications, Inc.
- ☐Other ____________

4. Intelligent Hubs:
- ☐Ascom Timeplex, Inc.
- ☐AT&T/NCR Corp.
- ☐Cabletron Systems, Inc.
- ☐Chipcom Corp.
- ☐David Systems, Inc.
- ☐Hewlett-Packard Co.
- ☐Optical Data Systems, Inc.
- ☐SynOptics Communications, Inc.
- ☐3Com Corp.
- ☐Ungermann-Bass, Inc.
- ☐Other ____________

5. LAN Diagnostic/Management Tools:
- ☐BICC Data Networks, Inc./3Com Corp.
- ☐Cabletron Systems, Inc.
- ☐Data General Corp.
- ☐Digilog, Inc.
- ☐FTP Software, Inc.
- ☐Hewlett-Packard Co.
- ☐Network General Corp.
- ☐NetWorth, Inc.
- ☐Novell, Inc.
- ☐Spider Systems, Inc.
- ☐Other____________

6. LAN Servers:
- ☐Advanced Logic Research, Inc.
- ☐AST Research, Inc.
- ☐Compaq Computer Corp.
- ☐Data General Corp.
- ☐Dell Computer Corp.
- ☐Digital Equipment Corp.
- ☐Everex Systems, Inc.
- ☐Hewlett-Packard Co.
- ☐IBM
- ☐Network Connection, Inc.
- ☐Other____________

7. Superservers:
- ☐AT&T Computer Systems
- ☐Auspex Systems, Inc.
- ☐Compaq Computer Corp.
- ☐Digital Equipment Corp.
- ☐Epoch Systems, Inc.
- ☐NCR Corp.
- ☐NetFRAME Systems, Inc.
- ☐Parallan Computer, Inc.
- ☐Tricord Systems, Inc.
- ☐Unisys Corp.
- ☐Other ____________

8. Network Operating Systems:
- ☐Banyan Systems, Inc.
- ☐Digital Equipment Corp.
- ☐IBM
- ☐Microsoft Corp.
- ☐Novell, Inc.
- ☐Other ____________

9. Peer-to-peer Network Operating Systems:
- ☐Apple Computer, Inc.
- ☐Artisoft, Inc.
- ☐Gateway Communications, Inc.
- ☐Hayes Microcomputer Products, Inc.
- ☐Invisible Software, Inc.
- ☐Novell, Inc.
- ☐Sitka Corp.
- ☐Tiara Computer Systems, Inc.
- ☐Webcorp
- ☐Other ____________

10. Wireless LANs:
- ☐BICC Communications
- ☐California Microwave
- ☐Motorola, Inc.
- ☐NCR Corp.
- ☐O'Neill Communications, Inc.
- ☐Photonics Corp.
- ☐Proxim, Inc.
- ☐Telesystems SLW, Inc.
- ☐Windata, Inc.
- ☐Other ____________

11. Apple Connectivity Products:
- ☐Alisa Systems, Inc.
- ☐Apple Computer, Inc.
- ☐Cayman Systems, Inc.
- ☐Digital Equipment Corp.
- ☐Farallon Computing, Inc.
- ☐Novell, Inc.
- ☐Pacer Software, Inc.
- ☐Shiva Corp.
- ☐Sitka Corp.
- ☐Webster Computer Corp.
- ☐Other ____________

SOFTWARE

12. Data Base Management Systems:

(a) LAN-based:
- ☐Borland International, Inc.
- ☐Computer Associates International, Inc.
- ☐Gupta Technologies, Inc.
- ☐IBM
- ☐Micro Data Base Systems, Inc.
- ☐Microsoft Corp.
- ☐Novell, Inc.
- ☐Oracle Corp.
- ☐Revelation Technologies, Inc.
- ☐XDB Systems, Inc.
- ☐Other____________

(b) Minicomputer-based:
- ☐Borland/Interbase Software Corp.
- ☐Computer Associates International, Inc.
- ☐Digital Equipment Corp.
- ☐Information Builders, Inc.
- ☐Informix Software, Inc.
- ☐Ingres Corp.
- ☐Oracle Corp.
- ☐Progress Software, Inc.
- ☐Sybase, Inc.
- ☐Unify Corp.
- ☐Other____________

CONTINUED ON NEXT PAGE

CONTINUED FROM PAGE 1

Network World 1992 Enterprise Technology Awards

(c) Mainframe-based:
- ☐Cincom Systems, Inc.
- ☐Computer Associates International, Inc.
- ☐Computer Corp. of America
- ☐IBM
- ☐Information Builders, Inc.
- ☐Oracle Corp.
- ☐Software AG
- ☐Other__________________

13. E-Mail Software:
- ☐Banyan Systems, Inc.
- ☐Beyond, Inc.
- ☐CE Software, Inc.
- ☐DaVinci Systems Corp.
- ☐Digital Equipment Corp.
- ☐Futurus Corp.
- ☐IBM
- ☐Lotus Development Corp./cc:Mail
- ☐Microsoft Corp.
- ☐Reach Software Corp.
- ☐Other __________________

14. Groupware:
- ☐Collaborative Technologies Corp.
- ☐Computer Associates International, Inc.
- ☐Coordination Technology, Inc.

CONTINUED ABOVE

- ☐Enable Software
- ☐Group Technologies, Inc.
- ☐Lotus Development Corp.
- ☐NCR Corp.
- ☐ON Technology, Inc.
- ☐Ventana Corp.
- ☐Other__________________

WIDE-AREA NETWORKS

EQUIPMENT

15. DSU/CSUs:
- ☐ADC Kentrox
- ☐AT&T Paradyne
- ☐Digital Link Corp.
- ☐Dowty Communications, Inc.
- ☐General DataComm, Inc.
- ☐Larse Corp.
- ☐Motorola Codex
- ☐Penril DataComm Networks
- ☐Racal-Datacom, Inc.
- ☐UDS Motorola
- ☐Other __________________

CONTINUED ABOVE

16. Integrated Network Management Systems:
- ☐AT&T
- ☐Cabletron Systems, Inc.
- ☐Digital Equipment Corp.
- ☐Hewlett-Packard Co.
- ☐IBM
- ☐International TeleManagement
- ☐MCI Communications Corp.
- ☐SunConnect
- ☐Systems Center, Inc.
- ☐Other __________________

17. Modems:
- ☐AT&T Paradyne
- ☐General DataComm, Inc.
- ☐Hayes Microcomputer Products, Inc.
- ☐Microcom, Inc.
- ☐Motorola Codex
- ☐Multi-Tech Systems, Inc.
- ☐Racal-Datacom, Inc.
- ☐Telebit Corp.
- ☐UDS Motorola
- ☐US Robotics, Inc.
- ☐Other __________________

CONTINUED ABOVE

18. Multiplexers:
- ☐Ascom Timeplex, Inc.
- ☐AT&T Paradyne
- ☐Gandalf Systems Corp./Infotron
- ☐General DataComm, Inc.
- ☐Motorola Codex
- ☐Network Equipment Technologies, Inc.
- ☐Newbridge Networks, Inc.
- ☐Racal-Datacom, Inc.
- ☐RAD Data Communications, Inc.
- ☐StrataCom, Inc.
- ☐Other __________________

19. Packet Switches:
- ☐Ascom Timeplex, Inc.
- ☐BBN Communications Corp.
- ☐BT North America, Inc.
- ☐Dynatech Communications, Inc.
- ☐Hughes Network Systems, Inc.
- ☐Motorola Codex
- ☐Netrix Corp.
- ☐Northern Telecom, Inc.
- ☐Sprint International
- ☐Telematics International, Inc.
- ☐Other __________________

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20. PBXs:
- ☐AT&T
- ☐Ericsson Information Systems
- ☐Fujitsu Business Communication Systems, Inc.
- ☐Hitachi America, Ltd.
- ☐InteCom, Inc.
- ☐Mitel, Inc.
- ☐NEC America, Inc.
- ☐Northern Telecom, Inc.
- ☐Rolm/IBM
- ☐Siemens Private Communications Systems
- ☐Other __________________

21. Videoconferencing Systems:
- ☐BT North America, Inc.
- ☐Compression Labs, Inc.
- ☐GPT Video Systems
- ☐Grass Valley Group, Inc.
- ☐NEC America, Inc.
- ☐Oki America, Inc.
- ☐PictureTel Corp.
- ☐Sony Corp. of America, Inc.
- ☐Videoconferencing Systems, Inc.
- ☐VideoTelecom Corp.
- ☐Other __________________

22. Voice Messaging Systems:
- ☐Applied Voice Technology, Inc.
- ☐AT&T
- ☐Boston Technology, Inc.
- ☐Centigram Communications Corp.
- ☐Digital Sound Corp.
- ☐Microlog Corp.
- ☐Northern Telecom, Inc.
- ☐Octel Communications Corp.
- ☐Rolm Co.
- ☐VMX, Inc.
- ☐Other__________________

SERVICES

23. Digital Private Line Services:
- ☐Advanced Telecommunications Corp.
- ☐American Private Line Services, Inc.
- ☐AT&T
- ☐Cable & Wireless Communications, Inc.
- ☐Consolidated Network, Inc.
- ☐MCI Communications Corp.
- ☐Metromedia Communications Corp.
- ☐Southern Pacific Telecommunications Co., Inc.
- ☐Sprint Corp.
- ☐WilTel
- ☐Other __________________

24. 800 Services:
- ☐Advanced Telecommunications Corp.
- ☐Allnet Communications Services, Inc.
- ☐AT&T
- ☐Cable & Wireless Communications, Inc.
- ☐LCI International
- ☐MCI Communications Corp.
- ☐Metromedia Communications Corp.
- ☐RCI Long Distance
- ☐Sprint Corp.
- ☐Other __________________

25. Frame Relay Services:
- ☐AT&T
- ☐BT North America, Inc.
- ☐CompuServe, Inc.
- ☐Graphnet, Inc.
- ☐Infonet Services Corp.
- ☐MCI Communications Corp.
- ☐Sprint Corp.
- ☐US West, Inc.
- ☐WilTel
- ☐Other __________________

26. ISDN Services:
- ☐AT&T
- ☐MCI Communications Corp.
- ☐Sprint Corp.
- ☐Other __________________

27. Switched Digital Services:
- ☐AT&T
- ☐MCI Communications Corp.
- ☐Sprint Corp.
- ☐Other __________________

28. Value-Added Network Services:
- ☐Advantage Systems, Inc.
- ☐BT North America, Inc.
- ☐CompuServe, Inc.
- ☐GE Information Services
- ☐Graphnet, Inc.
- ☐IBM Information Network
- ☐Infonet Computer Sciences Corp.
- ☐Sears Communications Co.
- ☐Sprint International
- ☐Other __________________

29. Virtual Network Services:
- ☐AT&T
- ☐Cable & Wireless Communications, Inc.
- ☐MCI Communications Corp.
- ☐Sprint Corp.
- ☐Other __________________

Name ____________________

Title ____________________

Company ____________________

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